

Costs and Benefits of Energy Efficiency Policies for Existing Buildings

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ABSTRACT

To achieve ambitious city-wide climate goals, sustainability staff and stakeholders advocate that mayors, city councils, and other decision-makers adopt energy efficiency policies to reduce emissions from buildings. In response, decision-makers often ask about the administrative costs of the prospective policies and programs. More specifically, they are interested in knowing the number of city staff needed and the other administrative costs involved in start-up and implementation. Decision-makers already wary of committing to policies without adequate data on costs and benefits will only be more hesitant to do so given current resource constraints. Further, few cities with programs publicize cost data, so it is not widely known. Cities do not report individual staff hired to carry out policies, and city budgets do not break down program costs. However, city staff look for objective, reliable data to improve data-driven policymaking and respond to requests from decision-makers and city councils.

This paper provides initial data on both the administrative costs of select local energy efficiency policies and the community-wide and distributional benefits associated with these policies. This paper takes a case-study approach and summarizes the costs and benefits of select energy efficiency policies implemented at the city-level (e.g., time-of-sale energy use disclosure, retrocommissioning requirements, etc.) In doing so, the resource provides objective, reliable data to improve data-driven policymaking as well as profile city experiences in developing and implementing policies. This paper also highlights key stakeholders, common challenges to adoption, and lessons learned from cities that have implemented these policies.

Introduction

Over the last several years, many cities in the United States have adopted energy efficiency requirements for existing commercial, multifamily, and single-family buildings. Large US cities 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. Being able to articulate the benefits of policies and programs—as well as whether the costs associated with them make those benefits worthwhile to attain—can be key to showing the value of these programs and policies. Examples of the importance of cost-benefit analysis are clear in several economic sectors. For example, cost-benefit tests are used across the country to guide the approval of utility-administered energy efficiency programs across the country (ACEEE 2018).

This paper addresses a vital knowledge gap by providing transparency on some of the costs and benefits associated with 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.

Methodology

Our findings are based on the results of semi-structured interviews with local government staff in nine cities that have already designed and begun implementing the policies listed in Table 1.

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 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 somewhat similar, and breaking out by each type of policy could compromise city anonymity.

In this paper, we do not identify the individual cities that we interviewed. We anonymized the data to encourage cities to share full cost and benefit information. We also do not provide detail on population as doing so would compromise city anonymity. However, we can disclose that the population of cities interviewed ranged from a minimum of 100,000 into the millions.

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. After the literature reviews, we moved to conducting interviews with local government staff. We identified short lists of cities that had enacted each policy listed in table 1 and recruited interview subjects from that list of cities. We conducted one-hour interviews that covered 1) the city experience in designing and implementing the program and 2) the administrative costs and benefits of the program. Specifically, the questions on costs covered three categories: design costs, implementation costs, and participation costs. We allowed cities to delineate design and implementation costs; however, formal adoption of the policy was a typical milestone marking the switch from the design phase to the implementation phase. Therefore, in the tables of policy costs below, design costs can generally be read as one-time costs occurring

prior to formal adoption of a policy, and implementation costs can generally be read as annual, recurring costs, although in some instances one-time costs may exist during the implementation phase. Design phase costs are the total amount spent for the entirety of the design phase, which generally lasted one to two years. Likewise, the list of benefits included three categories: community-wide benefits, equity-related benefits, and benefits to local government operations.

After completing the interviews, we transcribed the recordings of each interview. We used NVivo to analyze interviewee responses on design and implementation and identify patterns; we used spreadsheet-based analysis to compare costs and benefits for the programs.¹

Our research found that staff costs, as measured in full-time equivalent (FTE) employees, for policy and program design and implementation do marginally increase directly with city size. However, 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.

Limitations

This paper does not put forward a cost-benefit framework for evaluating city energy efficiency policies and programs. Instead, it simply presents costs and benefits side-by-side. Also, we chose not to normalize cost data by population because the result may lead some to overestimate the costs of policy design and implementation when applying the findings to their own local contexts.

Time-of-Sale Disclosure Policies

Table 2 provides a summary of the detailed information from local governments on the administrative and participant costs.

Table 2. Costs of time-of-sale disclosure policies

	Design costs		Annual implementation costs		Participant costs
City	FTEs used	Other costs	FTEs used	Other costs	Financial expenses
City A	1.5	\$90,000	1	\$2,000+	\$379 for average single-family home; \$1,152 for average commercial or multifamily building; \$110 per deferral

¹ NVivo is a qualitative data analysis software. For more information, please see <https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home>.

City B	2.5	\$27,700+	1*	\$43,699+	\$125 per assessment
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*City's reported FTEs were insufficient to successfully implement the policy.

Table 3 below details the benefits of time-of-sale disclosure policies.

Table 3. Benefits of time-of-sale disclosure policies

City	Reporting period	Percentage of building stock required to comply	Number of interventions	Jobs created (per 100,000 residents)
City A	Seven years	100%*	About 1,800 energy assessments	—**
City B	Three years	100%*	About 29,400 energy assessments	7.7 direct jobs

*Represents total proportion of single-family buildings that are subject to the policy when the building is listed or sold. **Dashes indicate that the city did not report the value of this metric because it was not being tracked.

Case study

One city pursued the policy to reduce GHG emissions stemming from the residential housing sector. The city originally began the policy design process with the intention of adopting a time-of-rent policy. But after engaging with low-income and historically marginalized communities, the city decided to pursue a time-of-sale policy instead. Further, engaging the real estate community was a challenge. Some within the real estate community attempted to argue that the time-of-sale policy would harm low-income households. However, due to the city's engagement with those groups, the city successfully countered those arguments and proceeded with the time-of-sale policy. The city identified several stakeholders that were involved in the process, including utilities, community-based organization that represent historically marginalized communities, federal and state energy departments, and the real estate community (e.g., homeowners, agents, brokers, etc.).

The city identified key implementation tasks such as ongoing education for home sellers and the real estate community, quality assurance, working with the multiple listing service, and compliance and enforcement. Compliance tracking can be especially difficult for time-of-sale energy disclosure policies because city staff often need to contact new home sellers, many of whom the city does not have existing relationships with.

Retrocommissioning and Building Tune-Up Policies

Table 4 provides a summary of the detailed information from local governments on the administrative and participant costs.

Table 4. Costs of retrocommissioning and building tune-up policies

	Design costs	Annual implementation costs	Participant costs
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City	FTEs used	Other costs	FTEs used	Other costs	Financial expenses
City C	1.5	\$30,000+	0.5*	\$70,000+	Cost of hiring specialist or cost of exemption
City D	Unknown	—**	Small team	Mailers	—
City E	1.75	\$694,000	1.5***	\$284,775+	—

*City's reported FTEs were insufficient to successfully implement the program.

** Dashes indicate that the city did not report the value of this metric because there was little to no cost.

***City uses 2.5 FTEs for implementation; however, the city hired consultants to provide one of these FTEs. The cost of this FTE (\$150,000) is included in consultant costs; here we show the number of local government FTEs used for implementation.

Table 5 reported the benefits of retrocommissioning and building tune-up policies as they relate to energy use or GHG emissions reductions.

Table 5. Benefits of retrocommissioning and building tune-up policies

City	Reporting period	Percentage of building stock required to comply	Emissions reductions	Jobs created (per 100,000 residents)
City C	One year (projected)	10%	5%	31.6 to 37.9 direct jobs
City D	—*	1.3%	—	—
City E	One-year average	7%	10,300 MTCO ₂ e	—

*Dashes indicate that the city did not report the value of this metric because it was not being tracked. Note: Percentage of building stock required to comply was calculated in all but one case 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). For one city, local government staff provided the percentage of building stock required to comply.

Case study

One city sought to adopt a policy that would help the city achieve its energy goals as identified by a local climate action plan. The city began by considering energy assessment policies, but stakeholder engagement persuaded the city to pursue a policy that resulted in direct energy savings and GHG emissions reductions. This process helped the city decide to adopt a retrocommissioning and tune-up policy. Local stakeholders included a variety of groups, included local buildings and trade associations, national laboratories, and the US Department of Energy. Stakeholder engagement also helped identify which measures and actions constitute retrocommissioning and tune-ups, as well as craft alternative compliance pathways. The city received some pushback from local unions that thought the policy would result in decrease workloads for existing building maintenance staff. The city clarified the rules such that credentialed, on-site workers would be eligible to conduct the tune-up.

Like other cities and policies, compiling a covered buildings list, creating informational materials, and issuing fines and citations are key implementation tasks. Communication is another important task, and the city developed a plan to help guide communication as it relates to

the policy. Notably, the city takes an adaptive approach to policy compliance. This means that the program is continuously evaluated to identify where changes in the implementation and communication processes need to be made. The evaluation also allows the city to ascertain community-wide benefits, such as GHG emissions reductions.

Benchmarking and Benchmarking-Plus Policies

Table 6 provides a summary of the detailed information from local governments on the administrative and participant costs (i.e., costs to building owners) of benchmarking and benchmarking-plus policies.

Table 6. Costs of benchmarking and benchmarking-plus policies

	Design costs		Annual implementation costs		Participant costs
City	FTEs used	Other costs	FTEs used	Other costs	Financial expenses
City F	1.5	\$60,000	0.5	\$2,000+	Cost of energy assessment if required
City G	1.25*	\$371,000+**	1.25*	\$9,500+	—***
City H	1	\$120,000	1.5	\$120,000+	\$800 to hire vendor or \$3,500 for citation
City I	2.5	\$157,000	1	\$61,000+	\$500 or cost of third-party benchmarking and verification

*City's reported FTEs were insufficient to successfully implement the policy.

**Includes \$300,000 of IT investments for both the design and implementations periods of multiple policies.

***Dashes indicate that the city did not report the value of this metric because there was little to no cost.

Table 7 reported the benefits of benchmarking and disclosure policies as they relate to energy use or GHG emissions reductions.

Table 7. Benefits of benchmarking and benchmarking-plus policies

City	Reporting period	Percentage of building stock required to comply	Total energy reductions	Total emissions reductions	Total dollars saved
City F	Two to three years	25%*	—**	—**	—**
City G	First year of compliance	14%	—	—	—
City H	One year average	30%	2.4%***	—	—
City I	Two years†	20%‡	2.5%	9%	\$3.06 million

*Percentage of total building area—as opposed to the number of buildings—covered by the policy.

** Dashes indicate that the city did not report the value of this metric because it was not being tracked.

***Actual reductions are listed. The city reported reductions of 1.5% after adjusting for the discount rate.

†Benefits data presented apply only to buildings that consistently benchmarked data over a two-year period.

‡Commercial building stock only. Also: As noted in Table 5’s notes, we calculated the percentage of building stock required to comply using NREL data. See Table 5’s notes for additional information.

Case study

One city had identified benchmarking and disclosure as a policy to pursue in a city climate action plan. The city began by engaging stakeholders, such as associations that represented building owners and managers, on the benchmarking policy because prior experiences with environmental and climate change policy had shown that engagement is key to buy-in within the community. Through the engagement process, the city found that privacy matters were a key concern among stakeholders, and the city had to reassure stakeholders that building energy use data would not be shared by the city. The city also noted challenges to engagement, such as having to make the case for the policy and explain why benchmarking was important; this applied to both internal and external stakeholders. However, the city already had city council buy-in, so internal stakeholders was limited to other departments, such as the department responsible for issuing fines and citations.

The city identified key tasks for implementation such as compiling a covered buildings list, drafting educational materials, sending reminders, connecting building owners to utility incentives, and conducting data quality checks on submissions. The city used spreadsheets for data management related to the policy; however, the city noted that spreadsheets were difficult to work with and advanced data management software would be beneficial. Staying up to date with building contacts and creating a system to track contacts for specific buildings as another key task. Lastly, as the city only has a standalone benchmarking policy and is currently considering more stringent requirements for existing buildings, the city claimed it may have been helpful to have adopted a benchmarking-plus policy at the outset to serve as a stepping stone between benchmarking and these more stringent requirements.

Trends in Policy Costs and Benefits

In addition to compiling and comparing costs and benefits by policy, we also compared data across all cities. We found the following trends, which are discussed in more detail in the sections that follow.

- Policies are more expensive to design than implement
- Maximum FTEs are fairly low and fall or stay the same during implementation
- IT infrastructure costs are common and high
- Engagement costs vary
- Cities’ tracking of benefits is limited at best
- Cities are not tracking equity-related benefits

Policies are more expensive to design than implement

For the three categories of policies, in the design phase, 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.

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, such as retrocommissioning (RCx) and building tune-ups.

Maximum 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.

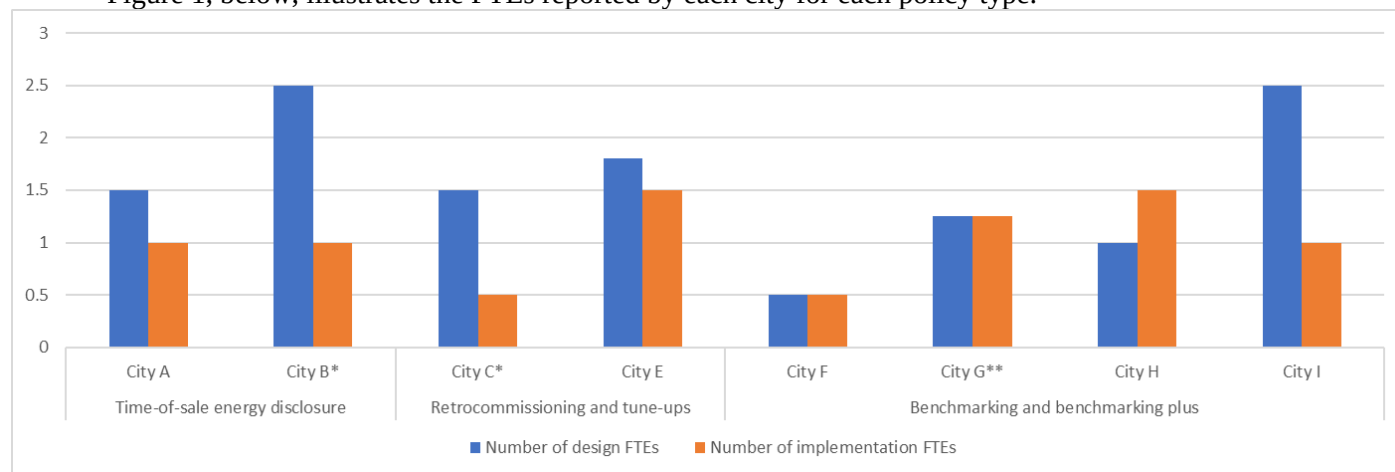


Figure 1. FTEs reported by cities for policy design and implementation. City D is excluded because it did not report quantitative FTE data.

*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 relatively 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.² 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 relatively 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.

² Design phase costs are the total amount spent for the entirety of the design phase, which generally lasted one to two years.

The numbers we present in Figure 1 are the reported FTEs, as opposed to the ideal FTEs. 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.

IT Infrastructure Costs are Common and High

IT infrastructure costs were high in both the design and the implementation phases. Funds 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. 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, though it would be an additional cost. 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 reported its benchmarking policy resulted in cumulative cost savings of \$3.06 million in properties that consistently benchmarked data over two years.

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.

Cities are Not Tracking Equity-Related Benefits

We asked cities about benefits to low-income households and to those identifying as Black, Indigenous, or people of color (BIPOC). 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 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. 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 and Implementation

Beyond conversations on the administrative costs and community-wide benefits of these programs, we also discussed city experiences with designing and implementing them. We include a table of the key considerations and trends below.

Table 8. Design and implementation trends across policy categories

Policy phase	Trend
Design	Cities pursue policies to achieve climate goals
Design	Stakeholders need education on policy details
Design	Multifamily residential and affordable housing sectors are largely excluded
Implementation	Creation of a covered buildings list
Implementation	Cities assisted resource-constrained home and building-owners
Implementation	Cities switch to advanced data management software midstream
Implementation	Cities check reports for errors and engage noncompliant building owners

Policies Pursued to Achieve Climate Goals

Cities adopted their policies primarily to reduce greenhouse gas emissions in the buildings sector through increased levels of energy efficiency. Cities pursued each particular policy because it had been listed in a climate action plan, sustainability plan, or a similar planning effort.

Stakeholders Need Education on Policy Details

Local government staff typically found that building owners and managers who were required to comply with policies were not familiar with the necessary tools to comply with the

policies. In fact, they typically were not familiar with the policies themselves. Cities needed to help stakeholders understand policy specifics and any associated tools.

Affordable Housing Sectors Largely Excluded

Several cities' policies excluded the multifamily and affordable housing sectors due to stakeholder concerns that including them would increase rents for low-income households and households of color. Some cities initially included these sectors but removed them. However, those living in affordable housing with high energy burdens can particularly benefit from energy efficiency interventions.

Creation of a Covered Buildings List

For retrocommissioning and benchmarking policies, creating a list of all buildings that are required to comply with a policy is a key implementation task. 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. Cities noted that the process of developing a covered buildings list was labor- and time-intensive. The process also had to be repeated annually. Local government staff also noted that collecting and maintaining building contacts was key.

Assisting Resource-Constrained Home and Building Owners

Some cities used help desks and other methods to provide compliance assistance to building owners. Several cities offered an additional level of assistance to resource-constrained owners (e.g., nonprofits, houses of worship, low-income homeowners) that lacked either the financial capital or the staff to comply with the policy. This additional assistance typically took the form of extending compliance cycles, subsidizing compliance costs, providing deferrals, or offering free data verification services.

Switching to Advanced Data Management Software Midstream

Midstream changes to IT infrastructure and reporting procedures were common. Some cities initially used spreadsheets to manage data but transitioned away from this approach (e.g., moving from Excel spreadsheets to a Salesforce-based compliance tool). Switches to more advanced tools allowed cities to automate some aspects of implementation that previously had required staff time to execute, such as sending reminder emails.

Checking reports for errors and engaging noncompliant building owners

For all policies, city staff needed to review compliance reports for errors, inconsistencies, and poor-quality data. They also had to conduct follow-ups on problematic submissions. 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.

Recommendations

We identified the below recommendations for jurisdictions considering these policies. Some of these recommendations are direct recommendations from interviewees and others are based on ACEEE data analysis.

- *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. 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. 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.
- *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. 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.
- *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.
- *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.
- *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.

Conclusions

We found that while cities had detailed data on design phase and implementation costs, cities had significantly less data on program benefits. Cities could better gauge the impact of these policies by tracking 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 discussed here 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. As decisionmakers in cities consider the policies discussed here, they can use this data as a starting point for informed and better-formed policy development and implementation.

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