# The 2017 City Energy Efficiency Scorecard

David Ribeiro, Tyler Bailey, Ariel Drehobl, Jen King,
Stefen Samarripas, Mary Shoemaker, Shruti Vaidyanathan,
Weston Berg, and Fernando Castro-Alvarez

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529 14th Street NW, Suite 600, Washington, DC 20045

Phone: (202) 507-4000 • Twitter: @ACEEEDC

Facebook.com/myACEEE • aceee.org

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## About the Authors

**David Ribeiro** conducts research on local energy efficiency policy, the energy–water nexus, and community resilience. He is the lead author of the biennial *City Energy Efficiency Scorecard*.

**Tyler Bailey** specializes in local-level energy efficiency policies, contributing to ACEEE's work on community resilience, the link between energy and water, and energy efficiency in low-income communities.

**Ariel Drehobl** does research, analysis, and outreach on local-level energy efficiency policies and initiatives, with a focus on energy affordability and low-income communities. Her current work examines utility programs targeted at low-income single-family households.

**Stefen Samarripas** studies, analyzes, and does outreach on policies and programs that encourage energy efficiency in local communities. Currently his work focuses on scaling up energy efficiency investments in affordable multifamily buildings.

**Mary Shoemaker** conducts research and analysis on energy efficiency policy, tracking and evaluating relevant state and federal legislation and agency regulations. In particular, Mary explores the role of energy efficiency as a means to comply with air pollution regulations, particularly the Clean Air Act and Section 111(d) obligations for states.

**Shruti Vaidyanathan** helps coordinate research efforts organization-wide and has 10 years' experience in transportation efficiency issues. As lead analyst for ACEEE's greenercars.org, she has most recently worked on improving mobility at the state and local levels and on evaluating the life-cycle emissions of vehicles.

**Jen King** performs research for ACEEE's Buildings program, with a focus on residential and commercial buildings, including advanced technologies and efficiency retrofit program design. Jen leads studies on smart buildings and smart homes for ACEEE and assists efforts to advance efficiency in model energy codes and equipment standards.

**Weston Berg** conducts research, analysis, and outreach on energy efficiency policy areas including utility regulation, state government policies, and building energy codes. He also leads development of ACEEE's annual *State Energy Efficiency Scorecard* report and State Energy Efficiency Policy Database.

**Fernando Castro-Alvarez** worked as an intern for the Utilities, State, and Local Policy team at ACEEE in 2016 and 2017, researching energy management systems in various localities and contributing to local policy projects.

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ACEEE is solely responsible for the content of this report.

## Executive Summary

Energy efficiency is one of the least expensive, most abundant, and most underused resources for local economic and community development. Saving energy can make communities more resilient while also protecting human health and the environment. Energy efficiency investments also save money for households and businesses, catalyze local reinvestment, and create local jobs.

Local governments around the United States can influence energy use in their communities in many ways: through land use and zoning laws, building codes, public finance, transportation investment, economic and workforce development, and in many cases the provision of water and energy. Local and metropolitan energy efficiency initiatives give visible benefits to residents, directly improving the communities where they live and work.

*The 2017 City Energy Efficiency Scorecard* compiles information on local policies and actions to advance energy efficiency, comparing cities across five policy areas. This third edition of the *City Scorecard* ranks 51 large cities, the same as in our previous edition.[1] To reflect the current and near-future policy environment, the *City Scorecard* considers implemented policies and those that have been adopted but are just beginning to be implemented. The resulting scores identify cities that are excelling and those that have room for improvement. We provide examples throughout the report of best practices used by leading cities. As a result, the *Scorecard* serves as a road map for local governments aiming to improve their cities' energy efficiency.

### *KEY FINDINGS*

*The 2017 City Energy Efficiency Scorecard* compares cities across five policy areas:

- Local government operations
- Community-wide initiatives
- Buildings policies
- Energy and water utilities
- Transportation policies

Figure ES1 shows how cities ranked overall.

[1] D. Ribeiro, V. Hewitt, E. Mackres, R. Cluett, L. Ross, S. Vaidyanathan, and S. Zerbonne, *The 2015 City Energy Efficiency Scorecard* (Washington, DC: ACEEE, 2015). aceee.org/research-report/u1502.

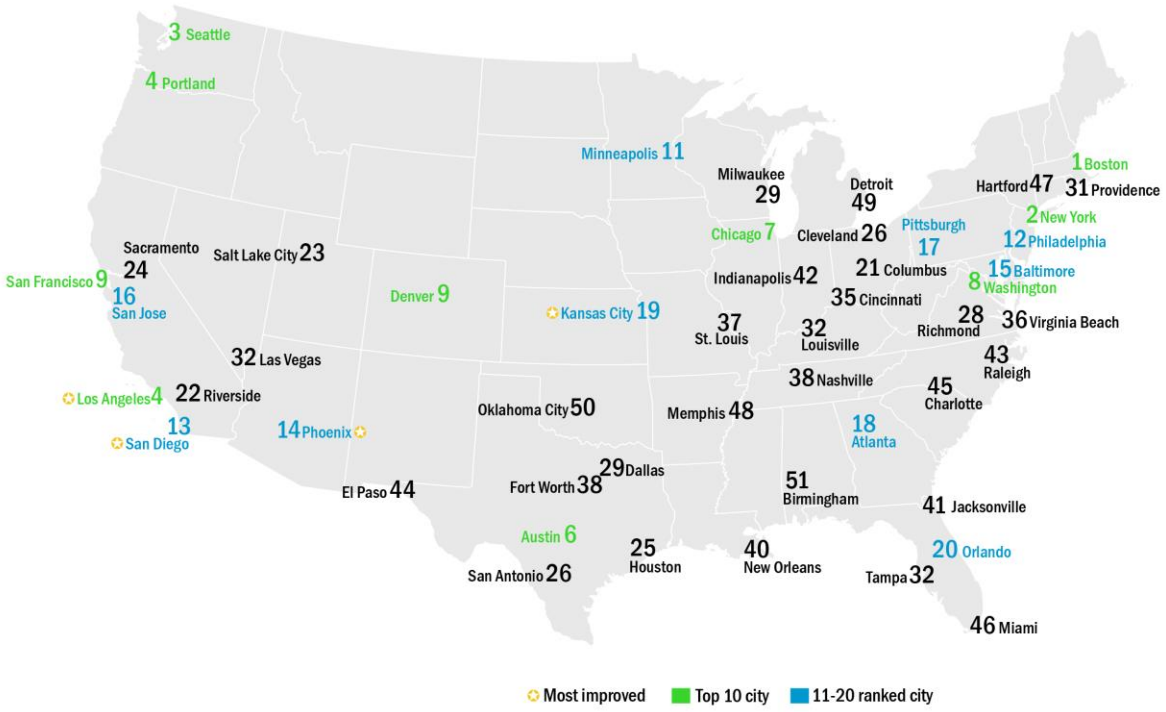


Figure ES1. *City Scorecard* rankings

**Boston** earned the top spot for the third *City Scorecard* in a row. It received 84.5 out of a possible 100 points, an improvement of 2.5 from its 2015 score. As in the 2015 edition, Boston scored well in all policy areas and excelled in buildings policies and energy and water utilities. The city continues to implement its building energy benchmarking requirements, enforce the Massachusetts Stretch Energy Code, and partner with its energy utilities through Renew Boston. The utilities serving the city have made substantial investments in electricity and natural gas efficiency programs and offer comprehensive low-income and multifamily programs.

Joining Boston at the top of the rankings are **New York** and **Seattle**, followed by **Los Angeles** and **Portland, Oregon** in a fourth-place tie. All have wide-ranging efficiency policies and programs. Los Angeles entered the top five (and the top ten) for the first time. Los Angeles's 25-point improvement in this edition paired with its 20-point improvement in the *2015 City Scorecard* fueled its rise into the top five.

Rounding out the top tier are **Austin, Chicago,** and **Washington, DC,** followed by **Denver** and **San Francisco** in a ninth-place tie. These cities, each of them a repeat top-ten performer, continue to demonstrate their commitment to efficiency.

**Los Angeles**, **San Diego**, **Kansas City**, and **Phoenix** are the most-improved cities compared with the last edition, with all showing double-digit scoring improvements. All these cities have made real strides in efficiency. For example, Los Angeles's Existing Building Energy

and Water Efficiency (EBEWE) program consists of energy audit, retrofit, and benchmarking requirements for commercial and residential buildings, as well as water efficiency measures. San Diego is another good example. The city's Climate Action Plan established goals to reduce energy use by 15% per housing unit in 20% of all such units and to reduce community-wide greenhouse gas (GHG) emissions by 15% by 2020.

**Thirty-two cities improved their scores, many with significant point increases**. In addition to the four most-improved municipalities, seven others improved their scores by at least 10 points. These cities are **Austin**, **Philadelphia**, **Denver**, **Pittsburgh**, **Orlando**, **Raleigh**, and **Portland**. Several of the 11 cities with double-digit improvement are currently ranked between 11th and 20th overall. If they maintain their momentum, they may reshuffle the top-ten rankings in future *City Scorecards*.

**Cities have taken positive steps since the 2015 edition**, especially for buildings policies. Eight cities have adopted benchmarking and transparency policies since the last edition, and several have either updated their building energy codes or advocated for the state to do so. More cities have also established community-wide goals to save energy and/or reduce their GHG emissions, and a growing number are on track to achieve these goals. Thirty-five cities in the 2017 edition have either energy or climate goals, whereas only 30 had such goals in 2015.

Leaders in efficiency in **local government operations** are **Denver**, **New York**, **Philadelphia**, **Portland**, and **Washington, DC**. All have set policies to increase efficiency in city government, procurement, and asset management.

The top-scoring cities in **community-wide initiatives** are **Austin, Minneapolis, Portland,** and **Washington, DC**. They have efficiency-related goals for the whole community and strategies to mitigate urban heat islands. They also have policies or programs to plan for future efficient distributed energy systems.

Leading cities in **buildings policies** include **Boston**, **Austin**, **Los Angeles**, and **New York**. These cities have adopted or advocated for stringent building energy codes, devoted resources to building code compliance, established requirements and incentives for efficient buildings, and increased the availability of information on energy use in buildings.

The leading cities in the **energy utilities** area are **Boston** and **Providence**. The energy efficiency programs of the utilities serving these cities offer high levels of savings and reach underserved markets, including low-income and multifamily households. **Austin**, **Boston**, **Columbus**, **Denver**, **Los Angeles**, **New York**, and **San Diego** are the leading cities in tackling efficiency in their water systems and water uses. Ratepayers in these cities have access to efficiency programs designed to save water and energy simultaneously.

Finally, cities with the top **transportation policies** scores include **Portland** and **New York**. Their initiatives include location efficiency strategies, shifts to efficient modes of transportation, transit investments, efficient vehicles and vehicle infrastructure, and energy-efficient freight transport.

**All cities, even the highest scorers, have significant room for improvement.** Boston was the only city to earn at least 80 points. Only 18 cities earned over half of the possible 100 points. All 51 cities can improve their efficiency initiatives to increase their scores.

While cities can improve across all policy areas, **cities have the most room for growth in transportation policies**. In most policy areas, at least one or two cities earned more than 90% of the available points. In transportation policies, however, only two cities earned more than 70% of the available points.

Table ES1 presents city scores in the five policy areas, their total scores, and the change in their scores and ranks from 2015.

Table ES1. Summary of scores

| Rank | City | State | Local government operations (10 pts) | Community-wide initiatives (12 pts) | Buildings policies (28 pts) | Energy and water utilities (20 pts) | Transportation policies (30 pts) | TOTAL SCORE (100 pts) | Change in score from 2015 | Change in rank from 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Boston | MA | 8.5 | 9 | 26 | 20 | 21 | 84.5 | 2.5 | 0 |
| 2 | New York | NY | 9 | 8.5 | 25 | 13 | 24 | 79.5 | 1.5 | 0 |
| 3 | Seattle | WA | 7.5 | 9 | 24 | 17 | 21 | 78.5 | 3.5 | 2 |
| 4 | Los Angeles | CA | 8.5 | 10 | 25.5 | 14.5 | 18 | 76.5 | 25 | 8 |
| 4 | Portland | OR | 9 | 11 | 17 | 15 | 24.5 | 76.5 | 10 | 4 |
| 6 | Austin | TX | 8 | 12 | 25.5 | 12 | 17.5 | 75 | 12.5 | 3 |
| 7 | Chicago | IL | 7 | 9 | 18.5 | 16.5 | 20.5 | 71.5 | 2 | -1 |
| 8 | Washington | DC | 9 | 11 | 20 | 12 | 19 | 71 | -5.5 | -5 |
| 9 | Denver | CO | 9 | 8 | 19.5 | 16 | 18 | 70.5 | 12 | 1 |
| 9 | San Francisco | CA | 6 | 10 | 19.5 | 17 | 18 | 70.5 | -5 | -5 |
| 11 | Minneapolis | MN | 8.5 | 12 | 14.5 | 16.5 | 16.5 | 68 | 1 | -4 |
| 12 | Philadelphia | PA | 9 | 10 | 16.5 | 11.5 | 15.5 | 62.5 | 12.5 | 2 |
| 13 | San Diego | CA | 8 | 7.5 | 14.5 | 16 | 13 | 59 | 24 | 14 |
| 14 | Phoenix | AZ | 8 | 7 | 17 | 12 | 13 | 57 | 13 | 4 |
| 15 | Baltimore | MD | 8 | 9 | 13.5 | 12.5 | 12 | 55 | 3 | -4 |
| 16 | San Jose | CA | 6 | 7 | 13.5 | 16.5 | 11.5 | 54.5 | 9 | 0 |
| 17 | Pittsburgh | PA | 8.5 | 9 | 16 | 9.5 | 10 | 53 | 12 | 3 |
| 18 | Atlanta | GA | 7.5 | 9 | 10 | 8 | 17 | 51.5 | 4 | -3 |
| 19 | Kansas City | MO | 7 | 7 | 13.5 | 9.5 | 12 | 49 | 14 | 8 |
| 20 | Orlando | FL | 7 | 9 | 14 | 5 | 10.5 | 45.5 | 12 | 10 |
| 21 | Columbus | OH | 6.5 | 8 | 9 | 13 | 8.5 | 45 | 6.5 | 4 |
| 22 | Riverside | CA | 3 | 8 | 11 | 11.5 | 9.5 | 43 | 4.5 | 3 |
| 23 | Salt Lake City | UT | 5 | 5.5 | 7 | 12 | 13 | 42.5 | 0 | -4 |
| 24 | Sacramento | CA | 4.5 | 6 | 9.5 | 13.5 | 7.5 | 41 | 0 | -4 |
| 25 | Houston | TX | 5.5 | 3.5 | 14 | 6.5 | 11 | 40.5 | -10.5 | -12 |
| 26 | Cleveland | OH | 6 | 4.5 | 8.5 | 9 | 10.5 | 38.5 | -0.5 | -2 |
| 26 | San Antonio | TX | 4 | 6.5 | 8.5 | 6 | 13.5 | 38.5 | -6.5 | -9 |
| 28 | Richmond | VA | 7.5 | 4.5 | 10.5 | 4.5 | 10 | 37 | 9 | 9 |
| 29 | Dallas | TX | 7 | 3 | 11 | 5 | 9.5 | 35.5 | -4.5 | -7 |
| 29 | Milwaukee | WI | 4.5 | 3.5 | 6.5 | 11 | 10 | 35.5 | -4.5 | -7 |
| 31 | Providence | RI | 7 | 3.5 | 2 | 15 | 7.5 | 35 | 3 | 1 |
| 32 | Las Vegas | NV | 6.5 | 2.5 | 8.5 | 7 | 9 | 33.5 | -1 | -3 |
| 32 | Louisville | KY | 5 | 7.5 | 4.5 | 4.5 | 12 | 33.5 | 7.5 | 8 |
| 32 | Tampa | FL | 1.5 | 5 | 12 | 7 | 8 | 33.5 | 8.5 | 10 |
| 35 | Cincinnati | OH | 4 | 6.5 | 8.5 | 6 | 7.5 | 32.5 | -1 | -5 |
| 36 | Virginia Beach | VA | 6 | 4 | 10.5 | 4.5 | 6.5 | 31.5 | 9 | 10 |
| 37 | St. Louis | MO | 3.5 | 5.5 | 6 | 7 | 9 | 31 | -0.5 | -4 |
| 38 | Fort Worth | TX | 3 | 2 | 11 | 7 | 7 | 30 | 2 | -1 |
| 38 | Nashville | TN | 3.5 | 3 | 9 | 3.5 | 11 | 30 | 3 | 1 |
| 40 | New Orleans | LA | 2.5 | 7 | 7.5 | 2.5 | 9 | 28.5 | 8.5 | 7 |
| 41 | Jacksonville | FL | 2 | 3 | 5 | 5.5 | 12.5 | 28 | 2 | -1 |
| 42 | Indianapolis | IN | 2 | 2 | 6.5 | 8 | 9 | 27.5 | 3 | 2 |
| 43 | Raleigh | NC | 2.5 | 2.5 | 6.5 | 6 | 9.5 | 27 | 12 | 6 |
| 44 | El Paso | TX | 3 | 1 | 7.5 | 6.5 | 6.5 | 24.5 | -5 | -9 |
| 45 | Charlotte | NC | 4.5 | 2.5 | 2 | 7.5 | 7.5 | 24 | -7.5 | -12 |
| 46 | Miami | FL | 1.5 | 5 | 6 | 2 | 8 | 22.5 | -6 | -10 |
| 47 | Hartford | CT | 1.5 | 1.5 | 3.5 | 11 | 4.5 | 22 | -1 | -2 |
| 48 | Memphis | TN | 2 | 1 | 2.5 | 5.5 | 7.5 | 18.5 | -6.5 | -6 |
| 49 | Detroit | MI | 1 | 0 | 4.5 | 9.5 | 3 | 18 | 0.5 | -1 |
| 50 | Oklahoma City | OK | 1.5 | 0.5 | 1 | 4 | 1 | 8 | -4 | 1 |
| 51 | Birmingham | AL | 0 | 1 | 0.5 | 0.5 | 5 | 7 | -7.5 | -1 |
| | **Median** | | **6.0** | **6.5** | **10.5** | **9.5** | **10.5** | **38.5** | **2.5** | |

### *STRATEGIES FOR IMPROVING EFFICIENCY*

As noted above, every city we analyzed has considerable room for improvement. We offer the following recommendations for cities that want to improve their energy efficiency and their ranking in the *City Scorecard.*

*Adopt energy savings targets.* Develop and codify energy efficiency goals for public and private-sector energy savings. Goals to reduce energy use, both community-wide and in government operations, can lay the foundation for further policy activity (Chapters 2 and 3).

*Lead by example by improving efficiency in local government operations and facilities.* Integrate energy efficiency into the day-to-day activities of local government. Adopt policies and programs to save energy in public-sector buildings and fleets and in standard practices such as procurement (Chapter 2).

*Actively manage, track, and communicate energy performance, and enable broader access to energy use information.* Tracking and reporting progress toward goals will reveal opportunities for improving energy plans, such as revising time lines, targets, or program strategies. Work with utilities to improve local government access to energy use data to better manage progress toward goals. Help increase energy data available to residents and businesses to encourage them to take their own efficiency actions (Chapters 2, 3, and 5).

*Adopt policies to improve efficiency in new and existing buildings.* To improve the efficiency of new buildings, ensure that building energy code enforcement and compliance activities are effective and well funded. If the city has authority under state law, adopt more stringent building energy codes; if not, advocate for the state to do so. To improve energy efficiency in existing buildings, provide incentives for efficient buildings, require energy audits, and implement energy performance requirements for certain building types. Encourage better integration of energy information into local real estate markets by requiring energy benchmarking, rating, and transparency (Chapter 4).

*Partner with energy and water utilities to expand access to energy efficiency programs.* Because utilities are the primary funders and administrators of efficiency programs in most places, partner with them to develop and administer an energy-saving strategy, plan, or agreement. As part of this, work with utilities to design energy efficiency programs to reach historically underserved markets such as low-income and multifamily households (Chapter 5).

*Decrease transportation energy use through location-efficient development and improved access to additional travel modes.* Use location-efficient zoning and integrate transportation and land use planning so residents can access major destinations via energy-efficient transportation. Expand transportation choices for residents, including those in low-income or affordable housing. Use complete streets policies and car- and bicycle-sharing programs to encourage a switch from driving to other modes of transportation.[2] Create neighborhoods that support safe, automobile-independent activities (Chapter 6).

[2] Complete streets policies promote the interconnectivity of streets to provide safe, convenient access for pedestrians, bicyclists, motorists, and public transportation users.

## Introduction

Energy efficiency is one of the least expensive, most abundant, and most underused resources for local economic and community development. Saving energy can make communities more resilient while also protecting human health and the environment. Energy efficiency investments also save money for households and businesses, catalyze local reinvestment, and create local jobs.

Local governments around the United States can influence energy use in their communities in many ways: through land use and zoning laws, building codes, public finance, transportation investment, economic and workforce development, and in many cases the provision of water and energy. Local and metropolitan energy efficiency initiatives give visible benefits to residents, directly improving the communities where they live and work.

*The 2017 City Energy Efficiency Scorecard* compiles information on policies and local actions to advance energy efficiency, comparing cities across five policy areas. This third edition of the *City Scorecard* ranks 51 large cities, the same as in our previous edition (Ribeiro et al. 2015). To reflect the current and near-future policy environment, the *City Scorecard* considers implemented policies and those that have been adopted but are just beginning to be implemented. The resulting scores identify cities that are excelling and those that have room for improvement. We provide examples throughout the report of best practices used by leading cities. As a result, the *Scorecard* serves as a road map for local governments aiming to improve their cities' energy efficiency.

### *IMPORTANCE OF CITY ENERGY EFFICIENCY*

Cities around the globe account for two-thirds of energy demand and 70% of energy-related carbon dioxide emissions (IEA 2016). Urban energy demand and carbon dioxide emissions may increase over time as city populations continue to grow. Cities' large shares of energy consumption and greenhouse gas (GHG) emissions mean that energy efficiency actions in urban areas and by local governments are critical in addressing the nation's and the world's energy and environmental challenges.

Many cities see energy efficiency as central to their initiatives to improve the sustainability of their communities. These efforts aim to enhance economic, social, and environmental well-being while developing the city's and residents' capacity to respond to change. Specifically, a growing concern about climate change motivates many cities to improve their energy efficiency and lower their emissions. Many are making plans to use energy efficiency to adapt to a changing climate and shifting energy portfolios. For example, Chicago recently touted energy efficiency's role in reducing community-wide GHG emissions by 7% within a five-year span (Chicago 2017). Thirty-six cities in the *Scorecard* have also joined the Compact of Mayors, created to capture and publicly report on cities' actions to reduce climate risk (Compact of Mayors 2017).

Local governments can use energy efficiency to advance other priorities too, including economic development and reductions in government spending. A sample of 110 cities around the world reported that, combined, they are saving or plan to save $40 million each year from efficiency improvements in government operations alone (Riffle, Appleby, and Martin 2013). For example, an energy retrofit project for four local government buildings in

Philadelphia has saved the city $1.9 million in utility bills and helped it earn $500,000 in rebates between the start of construction in 2012 and the end of 2014 (Philadelphia 2015). Energy efficiency also has clear benefits for city residents and businesses. For example, an LED lighting program administered by the Los Angeles Department of Water and Power will save $246 million in residential customer payments (Los Angeles 2017). In Portland, a nonprofit started by the city called Clean Energy Works helps facilitate energy efficiency improvements and has created 470 jobs (Portland 2015).

### *BENCHMARKING CITY EFFORTS AND SHARING BEST PRACTICES*

We update the *City Scorecard* biennially to benchmark the status of energy efficiency efforts in cities. In addition, we designed the *Scorecard* to be a tool to help cities develop sustainable approaches for cost effectively improving energy efficiency by learning from other cities' experiences. Finally, this report highlights innovative local policies for policymakers at all levels of government to consider. We focus on large US cities, but many of the policies and practices in the *Scorecard* are relevant to other cities, smaller localities, and other levels of government.

The report is organized into eight chapters. Chapter 1 describes our methodology, overall findings, and analysis of this edition's results. Chapter 2 scores cities' actions to improve the energy efficiency of their own local government operations. Chapter 3 focuses on community-wide initiatives and policies. Chapters 4, 5, and 6 take a closer look at policies associated with three major energy-related sectors: buildings, energy and water utilities, and transportation. Chapter 7 presents some cities' actual energy consumption data to identify trends in energy use. Chapter 8 wraps up the report with concluding thoughts.

We present the complete policy and program information used to score and rank the cities included in the ACEEE State and Local Policy Database.[3] It is publicly available and will be updated with each edition of the *City Scorecard* and as major policy developments occur. Local policymakers can use the database to learn about innovative energy efficiency policies and programs being implemented in other cities.

[3] The ACEEE State and Local Policy Database can be accessed at database.aceee.org.

# Chapter 1. Methodology and Results

Lead Author: David Ribeiro

The thousands of local governments in the United States vary in size and authority and have diverse priorities. As a result, they have taken different energy efficiency actions. We document this variety in the *Scorecard* by focusing on the activities of 51 large US cities across five policy areas. Our metrics are based on common policy categories and are broadly applicable to local governments in the United States, even those not in the *Scorecard*.

## *GOALS AND APPROACH*

Energy efficiency is important to policymakers, city residents, and businesses. It can make cities more livable, competitive, and resilient and can spur economic growth. We attempt to capture these diverse interests in our metrics. While this is primarily a scorecard that evaluates policies—including the adoption and implementation of local initiatives, practices, and programs—it also documents local leadership and the availability of energy efficiency offerings in each city.

The *Scorecard* describes and compares actions cities can take to enable or improve their energy efficiency. Our metrics are based on policy actions local governments can implement or influence. Most of our metrics measure whether cities have implemented particular policies or programs within their own borders.

In some cases, we also account for actions local actors other than the city government take, including other authorities or private entities. For example, if the water utility serving a city is not municipally owned, we still collected that utility's data for our water-related metrics. We also captured some actions by private entities, such as efficiency investments made by investor-owned utilities.

When we scored actions lying outside the direct influence of the city government, we did so for three reasons. First, the *City Scorecard* is an educational resource to inform policymakers and interested citizens. We would present only a partial picture of a city's energy efficiency policy environment if we focused solely on the city government. Second, each city's actions take place in a specific local, regional, and state policy environment. Regional and state policymakers also need to emphasize energy efficiency in policies, planning, and decision making. Local leadership can encourage learning and greater adoption of energy efficiency initiatives among these other authorities. Third, even if city governments do not manage energy-consuming entities, they can still influence them. They can do this through a variety of approaches, for example by establishing city practices that become de facto regional standards and engaging in the design and implementation of regional, state, and federal policy initiatives.

## *SELECTION OF CITIES*

We focus on cities and their governments due to the significant role cities play as centers of economic and cultural activity. The largest city in a metropolitan region can have influence beyond its borders due to its ability to fast-track or derail regional decisions. Central cities influence travel behavior and hold a large share of its region's commercial and industrial

buildings. Additionally, the leaders of cities with large populations can influence the policy of other local governments, states, and the federal government.

For the purposes of the *Scorecard*, we define a city as the area within whose political borders a local government has direct policy authority (e.g., the city of Detroit rather than the Detroit–Livonia–Dearborn metropolitan statistical area).

We include the same 51 cities in this edition of the *Scorecard* as we did in 2015. We assess the central city of each of the nation's 50 most populous metropolitan statistical areas (MSAs), excluding San Juan, Puerto Rico. The makeup of these MSAs has not changed since 2015. We also continue to include Fort Worth and El Paso, since we scored both of them in the *2013 City Scorecard* and grandfathered them into the *2015 City Scorecard* even though they did not fit the revised criteria.

The included cities have large populations within their borders (a median population of 632,309, with 124,006 in the smallest city) and are each a central city in an MSA with a large population (a median of 2,384,075, and none smaller than 1,145,647). These cities alone make up 14.9% of the population of the United States, and the metropolitan areas in which they are located contain 54.6% (Census 2016a; Census 2016c). Table 2 below lists the selected cities.

### *POLICY AREAS AND METRICS*

Our scoring is based on metrics that reflect the adoption and implementation of specific government policies, actions, or public services that can improve energy efficiency. The information contained in the *Scorecard*, and upon which we score the 51 cities, reflects existing policies as of January 31, 2017. Although the policy environments in cities vary considerably, our metrics capture a broad range of municipal actions. They measure policies and programs that achieve one or more of the following:

- Directly reduce end-use energy consumption
- Accelerate the adoption of the most energy-efficient technologies
- Provide funding for energy efficiency programs
- Set long-term commitments to reduce energy
- Establish or enforce mandatory or voluntary performance codes or standards
- Reduce market, regulatory, and information barriers to energy efficiency

All metrics are categorized into one of five policy areas, each having a chapter in the *City Scorecard*:

- Local government operations
- Community-wide initiatives
- Buildings policies
- Energy and water utilities
- Transportation policies

### *SCORING METHOD*

The maximum number of points a city can earn across all policy areas is 100. Figure 1 shows the distribution of these points across the five policy areas.

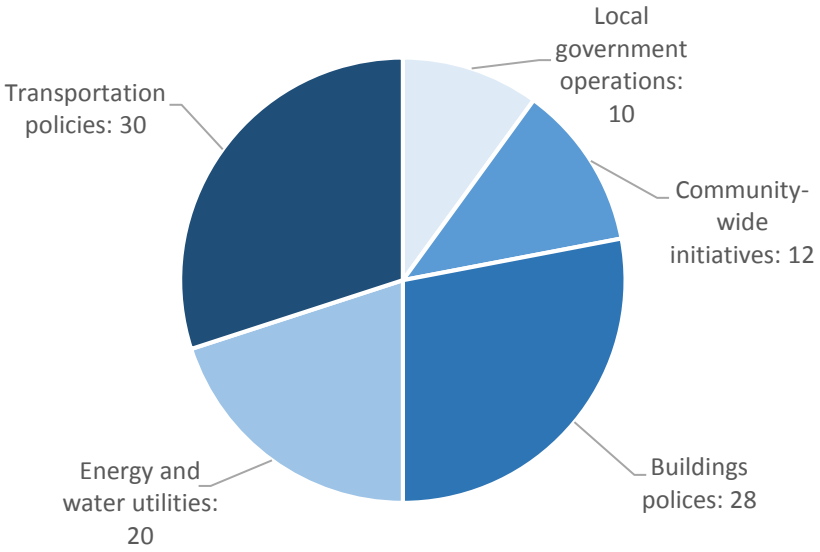


**Figure 1. Distribution of points by policy area**

We changed the distribution of points among policy areas in this edition of the *Scorecard*. For the 2013 and 2015 editions, we established our point distribution based on studies of relative energy savings opportunities, analyses of city energy consumption patterns, and assessment by ACEEE and external experts of the potential impacts of local government policies on improving energy efficiency. In this edition, we refined the point distribution based on an analysis of local energy consumption data from the ACEEE Local Policy Database and 2012 Commercial Building Energy Consumption Survey (CBECS) data.[4]

This year we allocated 10 points to policies and actions that increase efficiency in local government operations, a reduction from the 15 points allocated to that policy area in the 2015 edition. Our analysis of local energy data shows that local government–related energy use typically does not exceed 5% of community-wide energy consumption. This updated point allocation more closely approximates the sector's share of community-wide energy use while still reflecting the importance local government activities can have as building blocks for broader community efforts. We reallocated the 5 points from local government operations to community-wide initiatives, energy and water utilities, and transportation policies.

With these updated allocations, the points available across sectors more closely reflect transportation's and buildings' share of community-wide energy use. In a sample of 20 large cities, we found that transportation-related energy use accounted for 36% of community-wide energy consumption. In this year's *Scorecard*, we allocate 30 points to the

[4] Local energy consumption data are available for select cities in ACEEE's Local Policy Database. See database.aceee.org/sites/default/files/docs/local-energy-data.pdf.

transportation policies category and 2 additional points to transportation-related energy use in local government operations. With 32 points across the report assessing transportation activities, the point allocation better resembles transportation's share of energy use than in past *Scorecard* editions. Similarly, given that the four other policy areas focus largely on buildings, the share of points available for building-related energy use more closely resembles the 64% of community-wide energy use attributable to buildings.

In addition to reallocating points among policy areas, we made several methodology improvements since the 2015 edition. There were some metrics that most cities routinely earned full credit for in past *Scorecard*s, indicating that these metrics were no longer assessing cutting-edge practices. We eliminated these metrics from this year's *Scorecard*. We also removed metrics if updated research indicated a particular practice did not yield the degree of energy savings expected. Finally, we deemed some metrics as lower priority and removed them to accommodate the inclusion of new metrics assessing more innovative practices. The new metrics evaluate key policies or programs omitted from past *Scorecard*s as well as emerging efficiency practices. Most notably, we now assess efforts to bring energy efficiency to underserved markets, particularly low-income and multifamily households. We also added metrics to reflect the role of information and communications technology (ICT) in reducing energy use. See Appendix A for a detailed discussion of these changes.

As new research and data on local policy implementation and energy savings from efficiency become available, we will continue to refine the methodology, metrics, and scoring for future editions of the *City Scorecard*. Our goal is to collect and present the most relevant information regarding local efforts to save energy.

Table 1 presents the policy areas, metrics, and maximum points available.

Table 1. Scoring by policy area

| Policy area and subcategories | Maximum score |
|---|---|
| Local government operations | 10 |
| Local government energy efficiency–related goals | 4.5 |
| Procurement and construction policies | 3 |
| Asset management | 2.5 |
| Community-wide initiatives | 12 |
| Community-wide energy efficiency–related goals | 7.5 |
| District energy and combined heat and power | 2 |
| Urban heat island mitigation | 2.5 |
| Buildings policies | 28 |
| Building energy code stringency | 8 |
| Building energy code compliance | 6 |
| Requirements and incentives for efficient buildings | 8 |
| Benchmarking, rating, and transparency | 6 |
| Energy and water utilities | 20 |
| Electric efficiency spending | 3 |
| Natural gas efficiency spending | 1.5 |
| Electric savings | 3 |
| Natural gas savings | 1.5 |
| Low-income & multifamily programs | 4 |
| Energy data provision | 2 |
| Efficiency efforts in water services | 5 |
| Transportation policies | 30 |
| Sustainable transportation plan | 4 |
| Location efficiency | 6 |
| Mode shift | 6 |
| Transit | 5 |
| Efficient vehicles | 3 |
| Freight system efficiency | 3 |
| Affordable housing in transit-oriented developments | 3 |
| Maximum total score | 100 |

Subsequent chapters describe in detail the scoring method for each policy metric. All local governments have some influence over the policies we cover in the *Scorecard*, but the degree of city influence or capacity to act varies due to differing local policy environments, state laws, and local control over utilities (Hammer 2009). These factors affect the policy mechanisms cities can use to influence energy-related outcomes (C40 and Arup 2015; Hinge et al. 2013). Some of our metrics have alternate scoring tracks to account for these differing capacities to act. For example, to ensure a fair comparison, our scoring for cities with municipal energy utilities is different from our scoring for those with investor-owned utilities.

### *DATA COLLECTION AND REVIEW*

Our data collection process consisted of multistep outreach to local stakeholders in the cities we scored and energy efficiency experts nationwide. The steps included:

- *Methodology review*. We evaluated our previous methodology with a focus on data availability, distribution of earned points, and advancements documented in the literature. We engaged external experts and sustainability staff from select cities for their feedback. We discuss these methodology changes in Appendix A.

- *Data requests to cities and utilities and secondary data collection.* We asked local government staff (primarily sustainability directors and energy managers) or other knowledgeable city stakeholders to complete a data request and provide updates to the policy information listed in our Local Policy Database. Respondents in 41 of the 51 cities returned completed data requests. We also asked staff at electric and natural gas utilities to complete data requests. Of the 78 data requests sent to utility contacts, 53 were returned to us. The city and utility staff members who completed and returned data requests are included in table B1 of Appendix B. Where relevant, we also used publicly available sources to supplement data request responses.

- *Review and revision.* We applied the scoring methodology to the data we collected and wrote up the results presented in the *City Scorecard*. The document went through an extensive external review process during which experts and stakeholders reviewed and commented on the data we collected, the scores, and the methodology. Our external reviewers were the local government and energy utility staff whom we had contacted to complete our data requests and other experts in energy efficiency. We were grateful to receive more than 400 comments from 80 individuals.

### *BEST PRACTICE POLICY METRICS*

The *City Scorecard* contains best practice metrics to quantitatively score cities based on nuanced, qualitative policy information. These metrics reward cities implementing policies and programs that will likely lead to more energy-efficient outcomes. We scored cities on actions and policies rather than on explicit outcomes—such as energy performance or savings—whose exact relationship to policy actions can be difficult to gauge. Where we could, we went beyond policy *adoption* to score cities based on information regarding policy *implementation*, capturing actual energy-saving activities in a city.

Our focus on policy metrics is in keeping with our goal of providing actionable information to policymakers as well as residents and businesses. Policymakers need to know what they can do to improve their city's energy use based on their current situation. Residents and businesses most need information on what services, policies, and incentives are available to help them improve their efficiency. They also need access to resources about the policies they may want their policymakers to support.

While we do not include energy consumption outcomes in our scoring, we present and analyze energy use trends in Chapter 7. These energy performance data describe a city's energy-related characteristics, which may be the result of historical legacy, the makeup of the local economy, or factors that local policies cannot affect quickly. The limitations of our analysis (further discussed in Chapter 7) also are among the reasons we score cities based on their policymaking and adoption rather than their energy savings.

### *DATA LIMITATIONS*

Comparing cities remains challenging. There are broad differences in how cities track and report their data. Because there exist few central data sources that catalogue city-level energy efficiency policies and programs, we directly engaged city staff and energy utility staff for most of the information we used to assess cities. The response rate to our data request was high, but some cities and utilities did not complete it (table B1, Appendix B). When a city or utility did not complete a data request, ACEEE researchers independently collected data using the most recent publicly available information. Our reliance on independently collected data in some cases may mean that some activities in select cities were overlooked.[5]

## *2017 RESULTS*

We present the results of *The 2017 City Energy Efficiency Scorecard* in the scoring map and more fully in table 2 and figure 3. In the sections that follow, we discuss the leading cities, most-improved cities, trends in scoring, and sector scoring distributions and recommend strategies for improving efficiency in cities.

[5] We gave a city 0 points if we could not find information for a particular metric after extensive research.

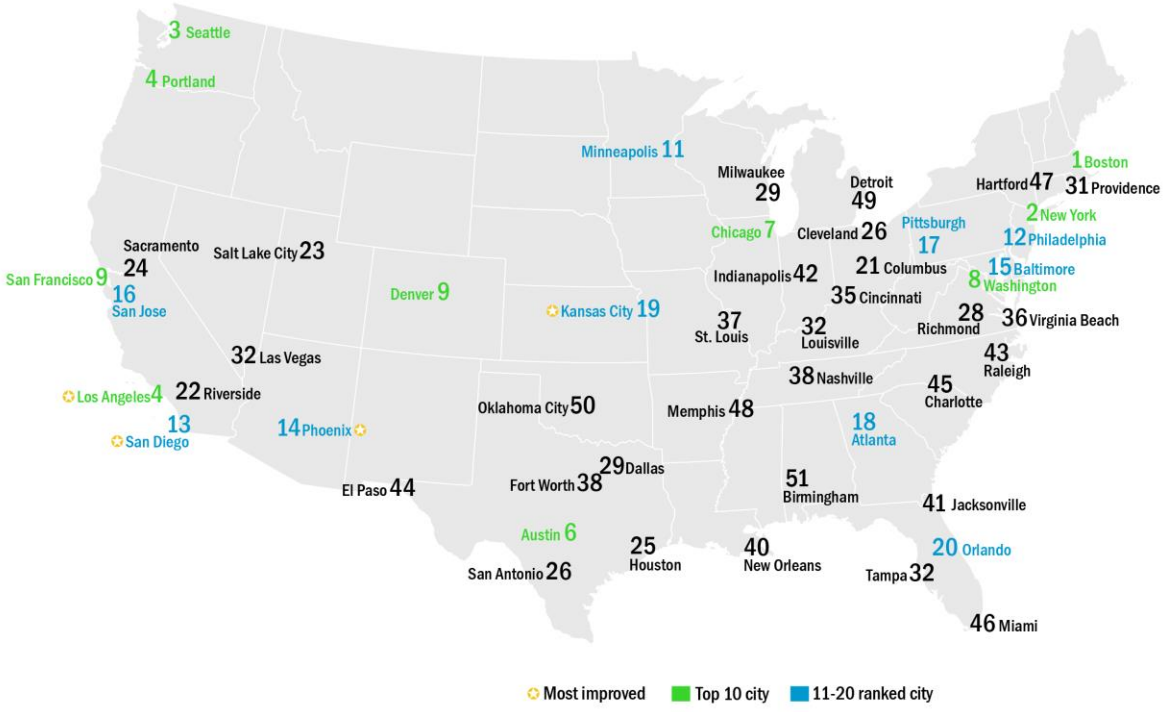


Figure 2. *City Scorecard* rankings

Table 2. Summary of scores

| Rank | City | State | Local government operations (10 pts) | Community-wide initiatives (12 pts) | Buildings policies (28 pts) | Energy and water utilities (20 pts) | Transpor-tation policies (30 pts) | TOTAL SCORE (100 pts) | Change in score from 2015 | Change in rank from 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Boston | MA | 8.5 | 9 | 26 | 20 | 21 | 84.5 | 2.5 | 0 |
| 2 | New York | NY | 9 | 8.5 | 25 | 13 | 24 | 79.5 | 1.5 | 0 |
| 3 | Seattle | WA | 7.5 | 9 | 24 | 17 | 21 | 78.5 | 3.5 | 2 |
| 4 | Los Angeles | CA | 8.5 | 10 | 25.5 | 14.5 | 18 | 76.5 | 25 | 8 |
| 4 | Portland | OR | 9 | 11 | 17 | 15 | 24.5 | 76.5 | 10 | 4 |
| 6 | Austin | TX | 8 | 12 | 25.5 | 12 | 17.5 | 75 | 12.5 | 3 |
| 7 | Chicago | IL | 7 | 9 | 18.5 | 16.5 | 20.5 | 71.5 | 2 | -1 |
| 8 | Washington | DC | 9 | 11 | 20 | 12 | 19 | 71 | -5.5 | -5 |
| 9 | Denver | CO | 9 | 8 | 19.5 | 16 | 18 | 70.5 | 12 | 1 |
| 9 | San Francisco | CA | 6 | 10 | 19.5 | 17 | 18 | 70.5 | -5 | -5 |
| 11 | Minneapolis | MN | 8.5 | 12 | 14.5 | 16.5 | 16.5 | 68 | 1 | -4 |
| 12 | Philadelphia | PA | 9 | 10 | 16.5 | 11.5 | 15.5 | 62.5 | 12.5 | 2 |
| 13 | San Diego | CA | 8 | 7.5 | 14.5 | 16 | 13 | 59 | 24 | 14 |
| 14 | Phoenix | AZ | 8 | 7 | 17 | 12 | 13 | 57 | 13 | 4 |
| 15 | Baltimore | MD | 8 | 9 | 13.5 | 12.5 | 12 | 55 | 3 | -4 |
| 16 | San Jose | CA | 6 | 7 | 13.5 | 16.5 | 11.5 | 54.5 | 9 | 0 |
| 17 | Pittsburgh | PA | 8.5 | 9 | 16 | 9.5 | 10 | 53 | 12 | 3 |
| 18 | Atlanta | GA | 7.5 | 9 | 10 | 8 | 17 | 51.5 | 4 | -3 |
| 19 | Kansas City | MO | 7 | 7 | 13.5 | 9.5 | 12 | 49 | 14 | 8 |
| 20 | Orlando | FL | 7 | 9 | 14 | 5 | 10.5 | 45.5 | 12 | 10 |
| 21 | Columbus | OH | 6.5 | 8 | 9 | 13 | 8.5 | 45 | 6.5 | 4 |
| 22 | Riverside | CA | 3 | 8 | 11 | 11.5 | 9.5 | 43 | 4.5 | 3 |
| 23 | Salt Lake City | UT | 5 | 5.5 | 7 | 12 | 13 | 42.5 | 0 | -4 |
| 24 | Sacramento | CA | 4.5 | 6 | 9.5 | 13.5 | 7.5 | 41 | 0 | -4 |
| 25 | Houston | TX | 5.5 | 3.5 | 14 | 6.5 | 11 | 40.5 | -10.5 | -12 |
| 26 | Cleveland | OH | 6 | 4.5 | 8.5 | 9 | 10.5 | 38.5 | -0.5 | -2 |
| 26 | San Antonio | TX | 4 | 6.5 | 8.5 | 6 | 13.5 | 38.5 | -6.5 | -9 |
| 28 | Richmond | VA | 7.5 | 4.5 | 10.5 | 4.5 | 10 | 37 | 9 | 9 |
| 29 | Dallas | TX | 7 | 3 | 11 | 5 | 9.5 | 35.5 | -4.5 | -7 |
| 29 | Milwaukee | WI | 4.5 | 3.5 | 6.5 | 11 | 10 | 35.5 | -4.5 | -7 |
| 31 | Providence | RI | 7 | 3.5 | 2 | 15 | 7.5 | 35 | 3 | 1 |
| 32 | Las Vegas | NV | 6.5 | 2.5 | 8.5 | 7 | 9 | 33.5 | -1 | -3 |
| 32 | Louisville | KY | 5 | 7.5 | 4.5 | 4.5 | 12 | 33.5 | 7.5 | 8 |
| 32 | Tampa | FL | 1.5 | 5 | 12 | 7 | 8 | 33.5 | 8.5 | 10 |
| 35 | Cincinnati | OH | 4 | 6.5 | 8.5 | 6 | 7.5 | 32.5 | -1 | -5 |
| 36 | Virginia Beach | VA | 6 | 4 | 10.5 | 4.5 | 6.5 | 31.5 | 9 | 10 |
| 37 | St. Louis | MO | 3.5 | 5.5 | 6 | 7 | 9 | 31 | -0.5 | -4 |
| 38 | Fort Worth | TX | 3 | 2 | 11 | 7 | 7 | 30 | 2 | -1 |
| 38 | Nashville | TN | 3.5 | 3 | 9 | 3.5 | 11 | 30 | 3 | 1 |
| 40 | New Orleans | LA | 2.5 | 7 | 7.5 | 2.5 | 9 | 28.5 | 8.5 | 7 |
| 41 | Jacksonville | FL | 2 | 3 | 5 | 5.5 | 12.5 | 28 | 2 | -1 |
| 42 | Indianapolis | IN | 2 | 2 | 6.5 | 8 | 9 | 27.5 | 3 | 2 |
| 43 | Raleigh | NC | 2.5 | 2.5 | 6.5 | 6 | 9.5 | 27 | 12 | 6 |
| 44 | El Paso | TX | 3 | 1 | 7.5 | 6.5 | 6.5 | 24.5 | -5 | -9 |
| 45 | Charlotte | NC | 4.5 | 2.5 | 2 | 7.5 | 7.5 | 24 | -7.5 | -12 |
| 46 | Miami | FL | 1.5 | 5 | 6 | 2 | 8 | 22.5 | -6 | -10 |
| 47 | Hartford | CT | 1.5 | 1.5 | 3.5 | 11 | 4.5 | 22 | -1 | -2 |
| 48 | Memphis | TN | 2 | 1 | 2.5 | 5.5 | 7.5 | 18.5 | -6.5 | -6 |
| 49 | Detroit | MI | 1 | 0 | 4.5 | 9.5 | 3 | 18 | 0.5 | -1 |
| 50 | Oklahoma City | OK | 1.5 | 0.5 | 1 | 4 | 1 | 8 | -4 | 1 |
| 51 | Birmingham | AL | 0 | 1 | 0.5 | 0.5 | 5 | 7 | -7.5 | -1 |
| | **Median** | | **6.0** | **6.5** | **10.5** | **9.5** | **10.5** | **38.5** | **2.5** | |

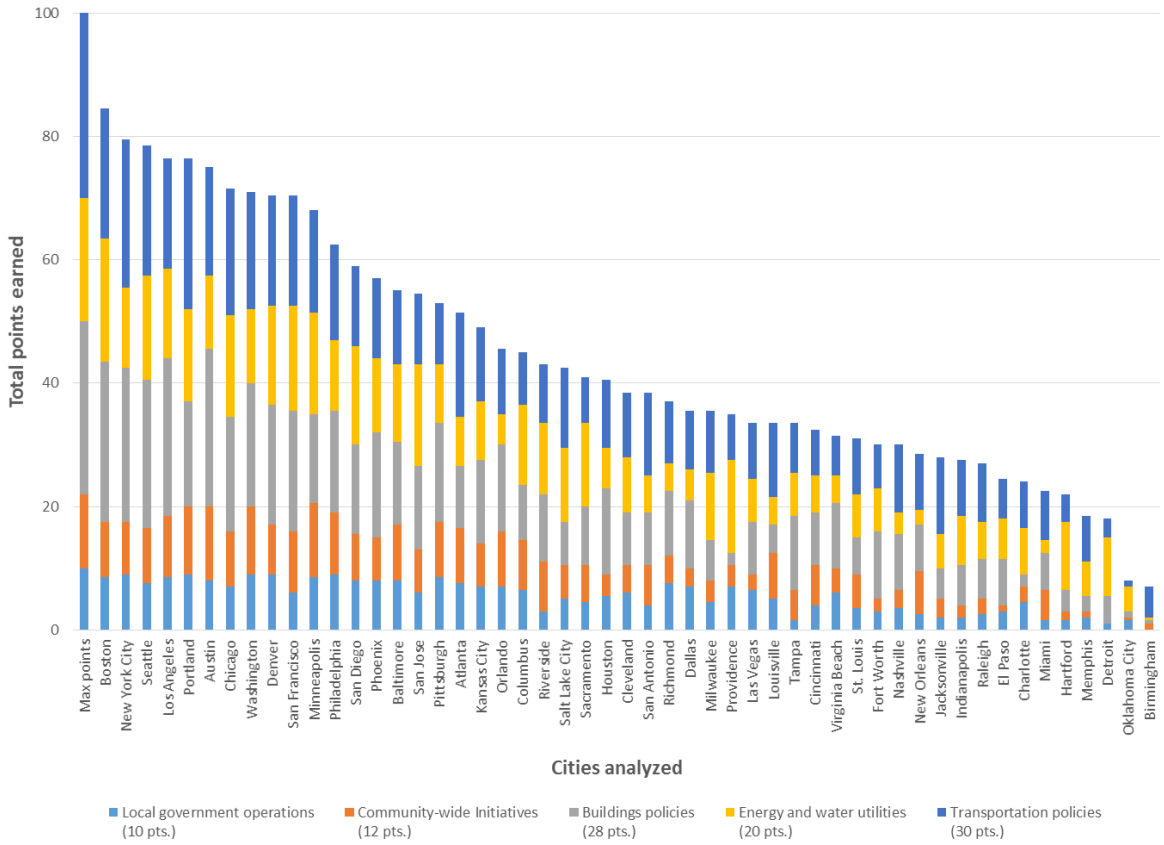


Figure 3. Scores by policy area

## 2017 Leading Cities

Due to continued leadership, Boston retained its position at the top of the *City Scorecard* rankings for the third consecutive edition. It was the leading city for buildings policies due to several policy efforts, including the continued enforcement of the Massachusetts Stretch Energy Code and the ongoing implementation of the Building Energy Reporting and Disclosure ordinance. Boston also received a perfect score for the energy and water utilities serving the city. They have made substantial investments in electricity and natural gas efficiency programs, offer comprehensive low-income and multifamily programs, and provide good access to energy data. Through Renew Boston, the city also works with the utilities to promote energy efficiency programs.

New York maintained the second spot in the rankings by earning 1.5 more points than in the last *Scorecard*. High levels of transit funding, widespread access to transit, incentives for affordable housing in transit-served areas, and sustainable freight initiatives helped New York achieve the second-highest marks for transportation policies. New York also achieved a top-five score for buildings policies due to the Greener, Greater Buildings Plan and related policies, including building rating and transparency requirements for commercial and multifamily buildings and requirements to improve efficiency in its largest buildings.

Seattle rose to third place in this edition with an improvement of 3.5 points. The city was a top-five scorer in three policy areas: buildings policies, transportation policies, and energy

and water utilities. In 2016, the city enacted a building tune-up policy and amended the existing benchmarking ordinance to require that building energy data be publicly available. Seattle has also set a goal to reduce commercial energy use 45% and residential energy use 63% to meets its 2050 climate goal.

With an improvement of 10 points, Portland, Oregon, earned fourth place overall, returning to a top-five ranking after falling a few spots in the *2015 Scorecard*. The city earned top marks in transportation policies due to its mode share and vehicle-miles-traveled reduction goals as well as several efforts to increase local efficiency. Portland was also a leading city in both local government operations and community-wide initiatives due in part to the adoption of GHG emission reduction goals.

Los Angeles jumped several spots to tie Portland for fourth overall. We discuss Los Angeles's policy improvements in the section that follows.

As in previous editions, the leading cities in the *2017 City Scorecard* show that communities around the country are dedicated to energy efficiency. The 10 top cities come from the Pacific Coast, Northeast, Midwest, Mountain West, and Texas.

### Most-Improved Cities

Thirty-two cities improved their scores since the last edition of the *City Scorecard*. Many had sizable increases, with the median increase being 8 points. Methodology changes affected some increases, but the majority of cities earned higher scores by pursuing new policies and program activity. We commend all cities for their improvements, but there were some with particularly notable point increases.

When selecting the most-improved cities, we focused on changes in score relative to the *2015 City Scorecard*. This edition's most-improved cities are Los Angeles, San Diego, Kansas City, and Phoenix. Table 3 shows these cities' changes in scores and ranks.

Table 3. Most-improved cities compared with the *2015 Scorecard*

| City | 2017 rank | 2017 score | Change in score | Change in rank |
|---|---|---|---|---|
| Los Angeles | 4 | 76.5 | +25 | +8 |
| San Diego | 13 | 59 | +24 | +14 |
| Kansas City | 19 | 49 | +14 | +8 |
| Phoenix | 14 | 57 | +13 | +4 |

With an increase of 25 points, Los Angeles is the most-improved city in the *2017 City Scorecard*. The improvement in this edition, paired with a 20-point increase in the *2015 City Scorecard*, adds up to a 45-point gain since the 2013 report. This has propelled Los Angeles from ranking twenty-eighth in the 2013 edition to fourth in this edition. While the city made improvements across the board, Los Angeles's significant improvement is largely due to the city's new Existing Building Energy and Water Efficiency (EBEWE) program. The EBEWE program consists of energy audit, retrofit, and benchmarking requirements for commercial and residential buildings, as well as water efficiency measures.

San Diego continued the most-improved trend among Southern California cities. Following very closely behind Los Angeles, San Diego earned 24 more points than in 2015. Policies formalized by the city's adoption of its Climate Action Plan led to some of the improvement. For example, the plan codifies goals to reduce energy use by 15% per housing unit in 20% of all such units in the city and to reduce community-wide emissions by 15% by 2020. In addition, California's adoption of the 2016 Building Energy Efficiency Standards for residential and nonresidential buildings further bolstered San Diego's score (just as it helped other cities in the state).

Kansas City increased its score by 14 points and moved up eight spots in the rankings. The highlight among the city's policy achievements is the adoption of the Energy Empowerment Ordinance, which requires energy benchmarking in large buildings. Kansas City also benefited from the *Scorecard*'s updated methodology, which puts more emphasis on setting and adopting energy efficiency–related goals in local government operations and community-wide.

Phoenix is the fourth most-improved city, with a gain of 13 points. The city increased its score in community-wide initiatives due to the adoption of the 2050 Environmental Sustainability goals, which include both energy savings and climate goals.

Several other cities deserve recognition for their improvements too. The number of cities that made sizable gains in the *2017 Scorecard* was impressive. Eleven cities, including the four most improved, increased their scores by at least 10 points. In the *2015 Scorecard*, only four cities improved by this margin. The other cities boosting their score by at least 10 points are Austin (+12.5), Philadelphia (+12.5), Denver (+12), Pittsburgh (+12), Orlando (+12), Raleigh (+12), and Portland (+10). This degree of improvement throughout the *Scorecard* indicates that local leaders are continuing to push for more energy savings.

### City Performance over Time

Table 4 shows the cities that have historically placed in the top ten of each *Scorecard* edition.

Table 4. Leading cities by *Scorecard* edition

| City | In top 5 | In top 10 |
|---|---|---|
| Boston | ’13, ’15, ’17 | ’13, ’15, ’17 |
| New York | ’13, ’15, ’17 | ’13, ’15, ’17 |
| Seattle | ’13, ’15, ’17 | ’13, ’15, ’17 |
| Portland | ’13, ’17 | ’13, ’15, ’17 |
| San Francisco | ’13, ’15 | ’13, ’15, ’17 |
| Washington | ’15 | ’13, ’15, ’17 |
| Los Angeles | ’17 | ’17 |
| Austin | None | ’13, ’15, ’17 |
| Chicago | None | ’13, ’15, ’17 |
| Denver | None | ’15, ’17 |
| Minneapolis | None | ’13, ’15 |
| Philadelphia | None | ’13 |

Table 4 shows the general consistency among the top-scoring municipalities in each *City Scorecard* edition. Overall, only 12 cities have made appearances in the top ten, and only Boston, New York, and Seattle have been in the top five of each *City Scorecard*. This consistency indicates these cities have been dedicated to energy efficiency for a longer time than others, which helps keep them at the top.

One new city has broken through into the top ten in each edition, however. In the *2015 Scorecard*, Denver cracked the top ten for the first time. Denver not only maintained a top-ten spot in this edition, but also moved up one rank. As discussed earlier, Los Angeles is the new top-ten city in the *2017 Scorecard* due the city’s quick rise through the ranks since 2013. Denver and Los Angeles show that while there has been consistency among the top scorers, new leaders are emerging. If cities want to maintain their positions atop the *City Scorecard* rankings, local decision makers must continue advancing energy efficiency policies.

### Interpreting Results

It is often helpful to look at city scores in groups or tiers of 10 when considering policy developments and attempting to contextualize results. In many cases, cities in the same tier exhibit similar levels of leadership on energy efficiency policy even though their local governments may have different priorities. Variations between individual cities, and particularly the few points that separate many of them, can be less important than the differences between these tiers. For example, Sacramento and Houston are in the third tier, separated by one rank and 0.5 points. Small point differences also separate other cities nearby in the rankings. These differences may be the product of small differences in priorities. However Tier 2 cities, ranked 11th to 20th, have separated themselves from Tier 3 cities and likely have lessons to offer them.

### SCORE VARIATION AND IMPROVEMENT AMONG TIERS

Nine cities from the *2015 Scorecard* returned to the top tier in this edition. As discussed earlier, Los Angeles is the new addition, making its first appearance in this tier. The difference between the total scores of the top tier's highest- and lowest-scoring cities is 14 points. This variation speaks to the policy accomplishments of the cities at the very top of the rankings. Among the top five cities, the difference between scores falls to 8. Most of the cities in the tier also improved their scores, with three cities improving their scores by more than 10 points.

The point variation in the second tier of cities is 22.5, the largest variation of any tier. However the large scoring improvements in the tier are the most noteworthy development. Not only did every city improve, but the tier contains three of the four most-improved cities. Also, the median score change within the tier was an increase of 12 points. If these cities continue their momentum, they will likely reshuffle the top tier in future rankings. Figure 4 shows changes in city scores by the five scoring tiers. It shows the second tier's improvement as compared with other tiers' changes in scores.

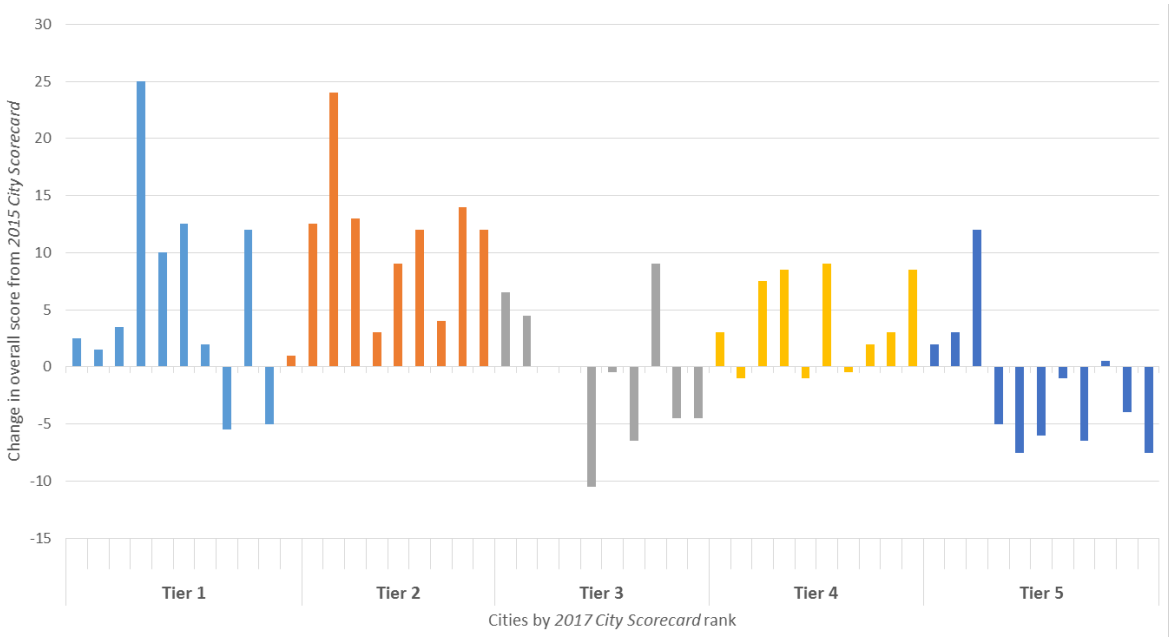


Figure 4. Changes in scores by tier

In the third and fourth tiers, the difference between the total scores of each tier's highest- and lowest-scoring cities is smaller than differences in the other tiers: 9.5 points separate the top and bottom cities in the third tier and 6.5 points in the fourth. The closely clustered scores indicate that small improvements in scoring will likely help cities move up in the rankings. Conversely, those who do not make improvements will fall in the rankings.

The scores in the bottom tier vary from 28 to 7, the largest variation in points after the second tier. These scores may indicate that cities in this tier are relatively new to energy efficiency activities, are just beginning comprehensive efficiency initiatives, or simply have not prioritized energy efficiency. It is also possible that we overlooked some policy activity

because five cities in this tier did not return data requests. The cities in the lowest tier have been generally consistent throughout the three *Scorecard* editions, but any one of them could quickly gain ground in future rankings if it began pursuing efficiency.

### Sector Scoring Distributions

Analyzing the distribution of scores by policy area can indicate how cities are prioritizing particular categories. Figure 5 shows the distribution of scores within each policy area and highlights in orange the scores of the overall top ten cities.

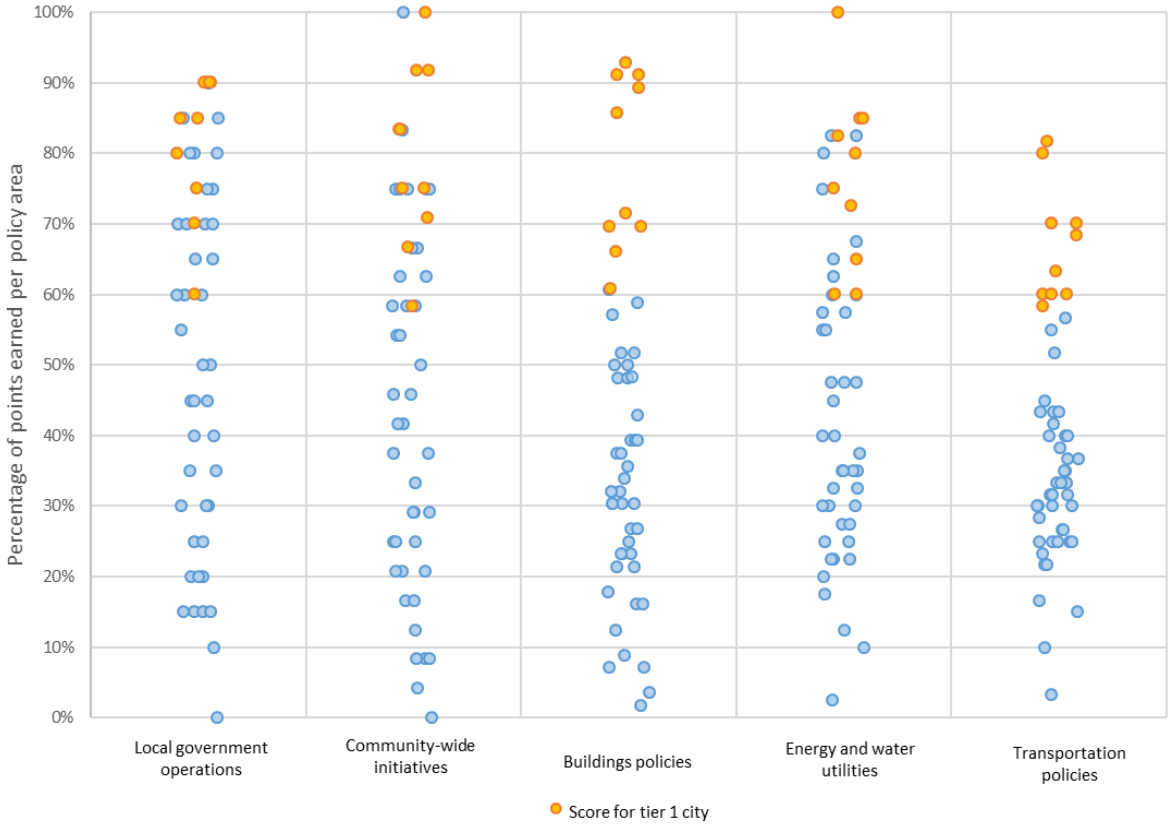


Figure 5. Point distribution by policy area

The scores are generally evenly scattered across the distributions for local government operations, community-wide initiatives, and energy and water utilities. The scores for buildings policies and transportation policies are more clustered.

Most scores are under the 70% mark in buildings policies, but a small cluster exists near 90%. This small group at the top shows that there are clear leaders in this category. In the report, we allocate buildings policies the second-highest number of points of any policy area. The expanded number of potential scoring outcomes could be a reason the leading cities for buildings policies have separated themselves from the pack. See Chapter 5 for a more detailed discussion of these leading cities.

In transportation policies, most scores are concentrated between the 20% and 45% marks, indicating many cities are in similar places in their pursuit of transportation-related energy efficiency policies. In addition, the concentrated scores for transportation policies sit lower

than the concentrations of city scores in the four other policy areas. Few cities' transportation scores break the 70% threshold. This may mean that transportation has been less of a priority for cities relative to other policy areas, or it may point to the complexity of transportation policy decisions since many are made with regional actors. Regardless, cities have the most room for growth in transportation policies.

Figure 5 also shows the opportunity for improvement across all the policy areas. While scores are lowest for transportation policies, only a small number of cities earned more than 90% of the available points in any given policy area.

Finally, focusing on the scores of the top tier cities in figure 5 shows where the overall leading cities perform best. Each top tier city earned one of the ten highest scores for building policies and transportation policies. They performed well in the other policy areas too, but cities outside the top tier were also among the leading cities in these policy areas.

#### POLICY TRENDS

Table 5 compares the results of this year's report to those of the *2015 City Scorecard*.

**Table 5. Cities gaining and losing points**

| Policy area | Cities gaining points | | No change | | Cities losing points | |
|---|---|---|---|---|---|---|
| Local government operations | 16 | 31% | 3 | 6% | 32 | 63% |
| Community-wide initiatives | 35 | 69% | 9 | 18% | 7 | 14% |
| Buildings policies | 32 | 63% | 4 | 8% | 15 | 29% |
| Energy and water utilities | 32 | 63% | 3 | 6% | 16 | 31% |
| Transportation policies | 17 | 33% | 5 | 10% | 29 | 57% |
| Total score | 32 | 63% | 2 | 4% | 17 | 33% |

In the two years between the 2015 report and this edition, 32 cities gained total points. Our analysis of results shows policy achievements in areas where cities are earning more points, particularly buildings policies. Since the last edition, eight cities (Atlanta, Denver, Los Angeles, Orlando, Portland, Saint Louis, Pittsburgh, and Kansas City) have adopted benchmarking and transparency policies. Several have also adopted more stringent building codes, have begun advocating for their states to adopt more stringent building energy codes, or are located in states that have adopted a more stringent building code. In addition, nearly 30 cities improved their scores for building energy code compliance, although some of the improvement is due to a change in scoring methodology.

In community-wide initiatives, it is unsurprising to see a scoring increase because we allocated another 2 points to the category. Underlying the scoring, though, we see a slight uptick in cities setting community-wide energy-saving or climate goals. Thirty-five cities have energy or climate goals in the 2017 edition, up from 30 in 2015. More cities in the *2017 Scorecard* are also on track to reach their goals—15 this year versus only 11 in the 2015 edition. Similarly, 37 cities earned credit for having some form of an energy efficiency–related goal for local government operations. Only 31 did so in 2015. Thirteen cities are on track to reach their local government operations goals in 2017, compared with 10 that were on track in 2015.

Scoring changes occurred due to changes in policy activity, changes in report structure and methodology, or a combination of the two. Some point changes resulted from our reallocation of points among the policy areas. For example, the total number of points available for local government operations is 10, a reduction of 5 points from the 2015 edition. Because the maximum possible score in this policy area is lower than in the past, it is not unexpected that 32 cities lost points there. Other changes are due to methodology improvements for specific metrics. In several instances, we raised the bar to reward cities for more ambitious policy actions. For example, in both local government operations and community-wide initiatives, cities no longer receive full points simply for having an energy efficiency–related goal and being on track to achieve it. In this edition, we also assess the stringency of each goal to recognize those cities setting targets for high levels of savings.

Several of the 17 cities that lost overall points did so due to this combination of reallocated points among policy areas and a higher bar for particular metrics. For example, Houston and San Antonio performed well in local government operations in the 2015 edition, but both lost several points in this policy area in 2017. Others lost points because of changes in the methodology's emphasis. This year's methodology gives more weight to energy efficiency–related goals. Charlotte lost points because it currently does not have any such goals. Generally speaking, though, no policy rollbacks led to cities losing points. This being the case, the number of cities losing points in a particular policy area does not indicate that cities are backtracking on past policy commitments.

### *STRATEGIES FOR IMPROVING EFFICIENCY*

Boston was the only city that earned more than 80% of the points available in the *City Scorecard*. This means that all cities have considerable room for improvement, even those ranked in the top tier. For cities wanting to improve their energy efficiency, and by doing so improve their scores in the *City Scorecard*, we summarize several high-level recommendations here and give examples of cities whose policies are leaders in the corresponding areas. All relevant policy information can be found in our State and Local Policy Database.

*Adopt energy savings targets.* Develop and codify energy efficiency goals for public- and private-sector energy savings. Goals to reduce community-wide and government operations energy use can lay the foundation for further policy activity.

> *Examples:* Columbus and Washington, DC (community-wide energy and climate targets), Denver and Pittsburgh (local government energy target)

*Lead by example by improving efficiency in local government operations and facilities.* Integrate energy efficiency into the day-to-day activities of local government. Adopt policies and programs to save energy in public-sector buildings and fleets and in standard practices such as procurement.

> *Examples:* Atlanta and Charlotte (building benchmarking, retrofits, and teleworking), Austin and Portland (procurement and construction policies)

*Actively manage, track, and communicate energy performance, and enable broader access to energy use information.* Track and report progress toward goals. This will reveal opportunities for improving energy plans, such as revising time lines, targets, or program strategies. Work with utilities to improve local government access to energy use data to better manage progress toward goals. Help increase energy data available to residents and businesses to encourage them to take their own efficiency actions.

> *Examples:* New York and Los Angeles (tracking progress and reporting on goals), Philadelphia and Salt Lake City (access to utility energy data)

*Adopt policies to improve efficiency in new and existing buildings.* To improve the efficiency of new buildings, ensure that building energy code enforcement and compliance activities are effective and well funded. If the city has authority under state law, adopt more stringent building energy codes; if not, advocate for the state to do so. To improve energy efficiency in existing buildings, provide incentives for efficient buildings, require energy audits, and implement energy performance requirements for certain building types. Encourage better integration of energy information into local real estate markets by requiring energy benchmarking, rating, and transparency.

> *Examples:* Austin and Baltimore (local energy code adoption), Boston and Orlando (energy benchmarking and transparency), New York (building benchmarking, energy audits, and tune-ups)

*Partner with energy and water utilities to expand access to energy efficiency programs.* Because utilities are the primary funders and administrators of customer efficiency programs in most places, partner with them to develop and administer an energy-saving strategy, plan, or agreement. As part of this, work with utilities to design energy efficiency programs to reach historically underserved markets, such as low-income and multifamily households.

> *Examples:* Minneapolis (Clean Energy Partnership), Boston (Renew Boston), Chicago (Retrofit Chicago)

*Implement policies and programs to decrease transportation energy use through location-efficient development and improved access to additional travel modes.* Use location-efficient zoning and the integration of transportation and land use planning to ensure that residents can use energy-efficient transportation to access major destinations. Expand transportation choices available to residents, including those living in low-income or affordable housing. Use complete streets policies and car- and bicycle-sharing programs to encourage a switch from driving to other modes of transportation.[6] Create neighborhoods that support safe, automobile-independent activities.

> *Examples:* Portland (location-efficient zoning and incentives), New York (funding for and access to public transit), Denver (travel mode targets and complete streets policy)

[6] Complete streets policies promote the interconnectivity of streets to provide safe, convenient access for pedestrians, bicyclists, motorists, and public transportation users.

# Chapter 2. Local Government Operations

Lead Authors: Mary Shoemaker, Tyler Bailey, and Fernando Castro-Alvarez

## *INTRODUCTION*

When local governments invest in energy efficiency, they not only show a commitment to reducing energy waste but also improve operational efficiency and economic performance. Many local governments use energy efficiency to reduce their costs and exposure to volatile energy prices. Energy use can account for as much as 10% of a local government's annual operating budget, a proportion that may rise as energy prices increase (EPA 2011a). As cities consider the life-cycle costs of their capital purchases and investments, it often makes strong financial sense to use energy efficiency to lower energy-related operating expenses. For example, energy-efficient buildings can produce lifetime cost savings in the millions of dollars relative to conventional buildings (EPA 2011a).

Local governments can lead by example by tackling energy use in their own operations. Efforts to increase energy efficiency in city operations are often seen as stepping stones to improving energy efficiency across the community (see Chapter 3). Municipal governments can advance energy efficiency by adopting strategies and employing new technologies to reduce energy use in their own buildings and vehicle fleet and by encouraging more-efficient employee behavior. Successful efforts will not only save energy and money but may also attract private-sector investment by demonstrating the feasibility of energy efficiency technologies and practices.

Many of the strategies in this chapter stem from mayoral goals, executive orders, or city council resolutions. These directives can spur action by articulating objectives, establishing time frames, and engaging key personnel. A growing commitment to mitigating climate change also drives local government operations initiatives in some communities. Local governments can often lower the cost of meeting emissions reduction targets by coordinating energy efficiency policies and programs with climate efforts (Hayes et al. 2014).

## *SCORING*

Cities could earn a maximum of 10 points for local government operations:

- Local government energy efficiency–related goals: adoption, stringency, progress, and public reporting practices (4.5 points)
- Energy-efficient procurement and construction policies (3 points)
- Integration of energy efficiency into asset management and maintenance strategies (2.5 points)

Points for local government operations make up 10% of the total possible points for the *2017 Scorecard*. In this year's edition we shifted points away from this area to more accurately reflect the proportion of a city's total energy use that is consumed by local government.

Many of the policies related to government operations included in this chapter have equivalent policies for the private sector (e.g., requiring that energy use in private buildings be benchmarked). We account for these community-wide efforts in the chapters that follow.

Unless otherwise noted, we relied on cities' publicly available energy and sustainability reports and websites for the data presented in the following sections. We supplemented publicly available information with a data request to municipal sustainability officers.

### *RESULTS*

Denver, New York, Washington, DC, Philadelphia, and Portland received the highest scores for local government operations. While no city received a perfect score across all metrics, several earned full points in two out of three categories, including Denver, Philadelphia, Portland., and Los Angeles.

Table 6 presents the overall scores for local government operations. We discuss the point allocation for individual metrics within these categories in the tables that follow in this chapter.

**Table 6. Scores for local government operations**

| City | Energy efficiency–related goals (4.5 pts) | Procurement & construction policies (3 pts) | Asset management (2.5 pts) | Total score (10 pts) |
|---|---|---|---|---|
| Denver | 3.5 | 3 | 2.5 | 9 |
| New York | 4 | 2.5 | 2.5 | 9 |
| Philadelphia | 4.5 | 2 | 2.5 | 9 |
| Portland | 4.5 | 3 | 1.5 | 9 |
| Washington | 4 | 2.5 | 2.5 | 9 |
| Boston | 4 | 2.5 | 2 | 8.5 |
| Los Angeles | 3 | 3 | 2.5 | 8.5 |
| Minneapolis | 3.5 | 3 | 2 | 8.5 |
| Pittsburgh | 3.5 | 3 | 2 | 8.5 |
| Austin | 3 | 3 | 2 | 8 |
| Baltimore | 3.5 | 2.5 | 2 | 8 |
| Phoenix | 3.5 | 2.5 | 2 | 8 |
| San Diego | 3.5 | 2.5 | 2 | 8 |
| Atlanta | 3 | 2 | 2.5 | 7.5 |
| Richmond | 4.5 | 1 | 2 | 7.5 |
| Seattle | 3 | 2 | 2.5 | 7.5 |
| Chicago | 2.5 | 3 | 1.5 | 7 |
| Dallas | 3.5 | 2 | 1.5 | 7 |
| Kansas City | 3.5 | 2 | 1.5 | 7 |
| Orlando | 3 | 2 | 2 | 7 |
| Providence | 3.5 | 1.5 | 2 | 7 |
| Columbus | 3.5 | 1.5 | 1.5 | 6.5 |
| Las Vegas | 3.5 | 1.5 | 1.5 | 6.5 |
| Cleveland | 3.5 | 1 | 1.5 | 6 |
| San Francisco | 2 | 2 | 2 | 6 |
| San Jose | 3 | 2 | 1 | 6 |

| City | Energy efficiency–related goals (4.5 pts) | Procurement & construction policies (3 pts) | Asset management (2.5 pts) | Total score (10 pts) |
|---|---|---|---|---|
| Virginia Beach | 3 | 1 | 2 | 6 |
| Houston | 1.5 | 1.5 | 2.5 | 5.5 |
| Louisville | 3.5 | 1 | 0.5 | 5 |
| Salt Lake City | 1.5 | 1.5 | 2 | 5 |
| Charlotte | 0.5 | 1.5 | 2.5 | 4.5 |
| Milwaukee | 1.5 | 1.5 | 1.5 | 4.5 |
| Sacramento | 3.5 | 1 | 0 | 4.5 |
| Cincinnati | 2.5 | 0.5 | 1 | 4 |
| San Antonio | 0 | 1.5 | 2.5 | 4 |
| Nashville | 2 | 0.5 | 1 | 3.5 |
| St. Louis | 1 | 1.5 | 1 | 3.5 |
| El Paso | 1 | 0.5 | 1.5 | 3 |
| Fort Worth | 1 | 0.5 | 1.5 | 3 |
| Riverside | 2 | 0 | 1 | 3 |
| New Orleans | 1 | 0.5 | 1 | 2.5 |
| Raleigh | 0 | 2.5 | 0 | 2.5 |
| Indianapolis | 0 | 1 | 1 | 2 |
| Jacksonville | 0 | 1 | 1 | 2 |
| Memphis | 0.5 | 0.5 | 1 | 2 |
| Hartford | 0.5 | 0 | 1 | 1.5 |
| Miami | 0 | 1 | 0.5 | 1.5 |
| Oklahoma City | 0.5 | 1 | 0 | 1.5 |
| Tampa | 0 | 0.5 | 1 | 1.5 |
| Detroit | 0 | 1 | 0 | 1 |
| Birmingham | 0 | 0 | 0 | 0 |
| **Median** | **3** | **1.5** | **1.5** | **6** |

For municipal energy efficiency–related goals, Philadelphia, Portland, and Richmond earned perfect scores. These cities all have energy efficiency and/or GHG reduction targets that require annual savings greater than 2%, and we project that each will meet at least one of these goals by their target dates. Portland, for example, has a goal to reduce energy consumption in city and county government buildings 2% annually and has exceeded this goal by reducing consumption 2.7% per year. Several other cities also earned high scores for municipal goals, including Boston, New York, and Washington. These three cities each have energy efficiency and GHG targets and are projected to meet at least one; however their targets were found to be slightly less stringent than the targets in the aforementioned cities. The diversity among the leading scorers across policy categories reflects the different paths cities are taking to make their operations more energy efficient.

Beyond the cities that earned the top overall scores, others had higher scores in specific metric categories. Austin and Portland earned perfect scores in procurement and construction. Austin, for example, not only has a fuel conservation policy for its vehicle fleet

but also has an above-code building requirement in place and another requirement to purchase all ENERGY STAR® certified office equipment. Several cities also scored full points in asset management. Seattle benchmarks more than 80% of its buildings in ENERGY STAR Portfolio Manager, has a comprehensive retrofit program for its municipal buildings, and has in place a telecommuting policy for all city employees. The median total score was 6 points this year (down 1 point from last year).

### *LOCAL GOVERNMENT ENERGY EFFICIENCY–RELATED GOALS*

Many local governments have adopted policies and goals that aim for portfolio-wide reductions in the energy used for their operations. These targets help to coordinate and focus sustainability efforts across departments. By making a clear and specific energy efficiency–related commitment, cities have a point of reference to measure progress against.

Efficiency goals in government operations are often intertwined with larger, community-wide efforts to improve efficiency or achieve other energy-related objectives. Some municipalities begin with government goals as a first step before establishing a citywide target. Others adopt goals for government operations to mirror citywide goals. And some cities adopt targets for municipal operations to lower operating costs even in the absence of goals for the private sector.

#### Existence of Goals

Cities earned up to 2 points for local government operations goals that included energy efficiency or energy use targets. Cities earned the full 2 points by identifying and formally adopting a goal by enactment through an executive order or city resolution. Cities earned up to 1.5 points for climate goals such as reductions in GHG emissions.[7] Those without energy efficiency or climate-related goals for local government operations did not receive points.

Table 7 summarizes this scoring methodology. Table C1 in Appendix C presents the details of cities' energy efficiency–related targets.

[7] We awarded points for climate goals since energy efficiency often plays a prominent role in cost effectively meeting such goals. It should be noted, however, that cities that do not explicitly have energy savings targets to complement emissions reduction targets may not reduce energy waste. For example, a city might meet its emissions reduction target by switching to less carbon-intensive energy sources or reducing solid waste–related emissions.

Table 7. Scoring for energy efficiency and climate goals in local government operations

| Energy efficiency or GHG emissions reduction goals for local government operations | Score (2 pts) |
|---|---|
| The city has formally adopted a long-term energy efficiency goal across municipal government operations. | 2 |
| The city has formally adopted a long-term GHG emissions goal across municipal government operations. | 1.5 |
| The city has a formally adopted a long-term energy efficiency or GHG emissions goal for one portion of municipal government operations (e.g., a segment of public buildings). | 1 |
| The city has identified an energy efficiency or GHG emissions goal in a proposal or draft action plan but has not formally adopted the goal. | 0.5 |

We gave 1 point to cities that have adopted municipal energy savings targets through the US Department of Energy's Better Buildings Challenge. We recognize the value of these goals in reducing energy costs and emissions from city government buildings; however, they do not necessarily encompass all municipal buildings. For this reason, we did not give these cities credit for goal stringency or progress (see tables 9 and 10, below).

### Stringency of Goals

This is the first *City Scorecard* in which we evaluate cities on the stringency of their municipal energy savings and climate goals. In order to recognize ambitious targets, we assessed cities based on the average annual energy or GHG emissions savings required to meet their goal. Cities could earn up to 1 point in this metric, as shown in table 8. Table C1 in Appendix C details the stringency of each city's nearest-term local government goal.

Table 8. Scoring for stringency of energy efficiency and climate goals

| Stringency of goals | Score (1 pt) |
|---|---|
| Average annual energy savings or emissions reduction is greater than or equal to 2%. | 1 |
| Average annual energy savings or emissions reduction is 1–2%. | 0.5 |
| Average annual energy savings or emissions reduction is below 1%, or no goal exists. | 0 |

### Progress toward Goals

Cities could earn up to 1 point based on progress toward their energy-related goals. Many cities have multiple energy goals with different time horizons. In many cases, one energy efficiency or GHG target is set to achieve a certain level of savings by 2020 and another is set to achieve a deeper level of savings by 2050. Rather than measuring city progress against all of their goals, we chose to evaluate cities based on their progress toward the most imminent future goal. Cities may earn up to 1 point in this metric, as shown in table 9.

Table 9. Scoring for progress toward goals

| Progress toward goals | Score (1 pt) |
|---|---|
| Reports quantitative energy savings or GHG emissions reductions and is on track to meet its nearest-term goal | 1 |
| Is not on track to meet near-term goal, but is projected to achieve savings within 25% of stated goal | 0.5 |
| Does not have a goal, is not projected to achieve savings within 25% of stated goal, or does not have quantitative savings proving it is on track. | 0 |

Cities that were on track to meet their goals received the full point. Cities that were not on track but were projected to come within 25% of their goal received 0.5 points. To be considered on track, cities had to have demonstrated past energy savings or GHG emissions reductions that, assuming an equal average annual savings rate for all future years until the goal year, would result in energy use or emissions at or below the goal level in the goal year. To give credit, we needed to be able to determine this trend using two or more municipal energy or GHG inventories. We used the level of savings reported in a city's most recent inventory to calculate its annual level of savings between its baseline and update years. We then estimated the city's future overall savings by projecting this annual percentage savings through the city's future target year.[8] To ensure that we reflected recent energy use or GHG levels in our savings projections, cities had to have published an updated inventory within the past five years (2012–2016) to earn credit. We did not award credit to cities without two years of quantitative performance data or with only inventories older than five years. Table C1 in Appendix C details each city's nearest-term local government goal and our projections for overall savings from local government operations.

### Annual Public Reporting

A city could earn 0.5 points for performance management reporting by local governments. We awarded 0.5 points to a city if it annually reported its progress toward energy savings or climate goals in a public report.

[8] For more information on the methodology used to project future energy savings or GHG reductions, see Ribeiro, Mackres, and Barrett 2014.

In previous *City Scorecards*, ACEEE credited local governments for specific performance management strategies they could use to help meet energy and climate goals. We no longer score on these because, while helpful for achieving goals, they are not essential for achieving successful outcomes. Nevertheless, we encourage local governments to remember the performance management strategies below.

**Performance Management Strategies for Local Governments**

Cities can use several best practices to progress toward their energy and climate goals, including the following.

**Dedicated funding.** Dedicate a funding source for efficiency investments, regularly fund efficiency investments outside the budget process (e.g., through a special-purpose entity), or prioritize efficiency investments in the capital planning and budgeting process.

**Energy management staff.** Allocate staff to municipal efficiency efforts. These dedicated staff members (e.g., an energy manager) can oversee operational energy management and coordinate efficiency efforts across municipal departments.

**Departmental incentives.** Offer incentives, either financial or otherwise, to city employees or departments for taking energy efficiency actions. Allow departments to retain cost savings resulting from their efficiency upgrades. Administer employee recognition programs.

More information on these strategies can be found in the *2015 City Scorecard* (Ribeiro et al. 2015).

Table 10 shows scores for each city's energy efficiency and GHG goals.

**Table 10. Scores for local government energy efficiency and GHG goals**

| City | Existence of goals (2 pts) | Stringency of goals (1 pt) | Progress toward goals (1 pt) | Annual public reporting (0.5 pt) | Total score (4.5 pts) |
|---|---|---|---|---|---|
| Philadelphia | 2 | 1 | 1 | 0.5 | 4.5 |
| Portland | 2 | 1 | 1 | 0.5 | 4.5 |
| Richmond | 2 | 1 | 1 | 0.5 | 4.5 |
| Boston | 2 | 0.5 | 1 | 0.5 | 4 |
| New York | 2 | 0.5 | 1 | 0.5 | 4 |
| Washington | 2 | 0.5 | 1 | 0.5 | 4 |
| Baltimore | 2 | 1 | 0 | 0.5 | 3.5 |
| Cleveland | 2 | 1 | 0 | 0.5 | 3.5 |
| Columbus | 1.5 | 0.5 | 1 | 0.5 | 3.5 |
| Dallas | 1.5 | 0.5 | 1 | 0.5 | 3.5 |
| Denver | 2 | 1 | 0 | 0.5 | 3.5 |
| Kansas City | 1.5 | 0.5 | 1 | 0.5 | 3.5 |
| Las Vegas | 1.5 | 0.5 | 1 | 0.5 | 3.5 |
| Louisville | 2 | 1 | 0 | 0.5 | 3.5 |
| Minneapolis | 1.5 | 0.5 | 1 | 0.5 | 3.5 |
| Phoenix | 2 | 1 | 0 | 0.5 | 3.5 |

| City | Existence of goals (2 pts) | Stringency of goals (1 pt) | Progress toward goals (1 pt) | Annual public reporting (0.5 pt) | Total score (4.5 pts) |
|---|---|---|---|---|---|
| Pittsburgh | 2 | 1 | 0 | 0.5 | 3.5 |
| Providence | 2 | 1 | 0 | 0.5 | 3.5 |
| Sacramento | 2 | 0 | 1 | 0.5 | 3.5 |
| San Diego | 2 | 0.5 | 0.5 | 0.5 | 3.5 |
| Atlanta | 2 | 0.5 | 0 | 0.5 | 3 |
| Austin | 1.5 | 1 | 0 | 0.5 | 3 |
| Los Angeles | 2 | 0.5 | 0 | 0.5 | 3 |
| Orlando | 2 | 1 | 0 | 0 | 3 |
| San Jose | 2 | 0.5 | 0 | 0.5 | 3 |
| Seattle | 2 | 0.5 | 0 | 0.5 | 3 |
| Virginia Beach | 2 | 0 | 1 | 0 | 3 |
| Chicago | 2 | 0 | 0 | 0.5 | 2.5 |
| Cincinnati | 1.5 | 1 | 0 | 0 | 2.5 |
| Nashville | 1.5 | 0.5 | 0 | 0 | 2 |
| Riverside | 1.5 | 0.5 | 0 | 0 | 2 |
| San Francisco | 1.5 | 0 | 0 | 0.5 | 2 |
| Houston | 1 | 0 | 0 | 0.5 | 1.5 |
| Milwaukee | 1 | 0 | 0 | 0.5 | 1.5 |
| Salt Lake City | 1 | 0 | 0 | 0.5 | 1.5 |
| New Orleans | 0.5 | 0 | 0 | 0.5 | 1 |
| El Paso | 1 | 0 | 0 | 0 | 1 |
| Fort Worth | 1 | 0 | 0 | 0 | 1 |
| St. Louis | 0.5 | 0 | 0 | 0.5 | 1 |
| Charlotte | 0.5 | 0 | 0 | 0 | 0.5 |
| Hartford | 0.5 | 0 | 0 | 0 | 0.5 |
| Memphis | 0 | 0 | 0 | 0.5 | 0.5 |
| Oklahoma City | 0.5 | 0 | 0 | 0 | 0.5 |
| Birmingham | 0 | 0 | 0 | 0 | 0 |
| Detroit | 0 | 0 | 0 | 0 | 0 |
| Indianapolis | 0 | 0 | 0 | 0 | 0 |
| Jacksonville | 0 | 0 | 0 | 0 | 0 |
| Miami | 0 | 0 | 0 | 0 | 0 |
| Raleigh | 0 | 0 | 0 | 0 | 0 |
| San Antonio | 0 | 0 | 0 | 0 | 0 |
| Tampa | 0 | 0 | 0 | 0 | 0 |

## *PROCUREMENT AND CONSTRUCTION POLICIES*

All local governments need purchasing and construction policies for their operations. This section assesses whether cities factored energy efficiency into these everyday decision-making processes. Procurement and construction policies with energy efficiency requirements help institutionalize energy efficiency across all local government departments. Because we assessed policies related specifically to energy efficiency, we did not consider actions related to energy supply, such as green power purchasing.

Typically, cities have made the greatest efforts to incorporate efficiency into investments in vehicle fleets, public lighting, and government buildings and equipment. Cities could receive up to 3 points for their procurement and construction policies, subdivided into these three metric areas.

### Fleet Efficiency and Vehicle Infrastructure

We allocated a total of 1 point across two metrics to vehicle fleet efficiency strategies. Many city sustainability efforts have focused on municipal vehicle fleet policies because they are effective in reducing carbon emissions and fuel expenditures.

We awarded 0.5 points to cities that had a fuel efficiency requirement for public fleet vehicles. Alternatively, we awarded 0.5 points if cities did not have a fuel efficiency requirement in place but had requirements for fuel-efficient vehicle types such as hybrid or all-electric. We did not award points to cities with alternative fuel (e.g., compressed natural gas) vehicle requirements, since alternative fuels are not inherently energy saving (DOE 2016b).

Cities could earn an additional 0.5 points if they employed fleet management software. Software programs such as Automile help fleet managers collect and analyze data such as driving behavior and vehicle condition in order to increase efficiency (Automile 2016). This metric replaced a metric from the *2015 City Scorecard* regarding anti-idling policies and driving behavior.

### Public Lighting

Cities can make some of their simplest energy efficiency improvements by upgrading public lighting. LED technologies can offer savings of 70% relative to traditional light sources (DOE 2016d). They also have longer lifetimes than traditional outdoor fixtures, meaning that they require significantly less maintenance. Scheduling lighting that turns on only during the hours when it is needed can also extend lamp lifetimes and save energy.

We allocated efficient public outdoor lighting a total of 1 point. Cities received 1 point for adopting the provisions of the Illuminating Engineering Society and International Dark-Sky Association's Model Lighting Ordinance (IES 2011) for their public outdoor lighting. Cities could also earn full credit if they adopted their own lighting policy with a lighting controls provision, which prohibits the use of lighting when sufficient daylight is available. We awarded 0.5 points to cities that have begun significant outdoor lighting replacement and upgrade programs but do not have an efficiency requirement in place. We did not give credit to policies or actions related to traffic lights because new traffic lights are now required by federal law to be of LED-equivalent efficiency.

### New Buildings and Equipment

Cities could earn up to 1 point for policies encouraging energy efficiency in public building construction and in procurement of equipment and supplies. We awarded 0.5 points to cities with green building requirements for new public buildings. For example, we awarded credit if a city requires municipal buildings to exceed the citywide energy code or meet a criterion like Leadership in Energy and Environmental Design (LEED) certification.[9]

We also scored city procurement policies in this category. Local governments that install energy-efficient products in their facilities can reduce building energy use by as much as 5–10% (EPA 2011b). Local governments may also see other benefits, including reduced maintenance costs from longer product lifetimes. Preexisting policy frameworks for this topic have been helpful to many cities. For example, the US Environmental Protection Agency (EPA) Environmentally Preferable Purchasing (EPP) guidelines were originally created for the federal government but now serve as the basis for many local government procurement policies. Local governments that adopt the EPP guidelines can effect changes across local government operations, including consideration of energy efficiency in purchase decisions for desktop electronics, vehicles, and equipment. We awarded cities 0.5 points for having an energy efficiency or life-cycle cost consideration in their procurement policy. For example, a city that has ENERGY STAR requirements for appliance and electronics purchases received 0.5 points.

### Scores

Table 11 lists scores for each city's procurement and construction policies.

**Table 11. Scores for procurement and construction policies**

| | Fleet efficiency and vehicle infrastructure | | Public lighting | New buildings and equipment | | |
|---|---|---|---|---|---|---|
| City | Fuel efficiency requirement (0.5 pt) | Use of fleet management software (0.5 pt) | Outdoor lighting standard (1 pt) | Above-code requirements for public buildings (0.5 pt) | Energy-efficient procurement policy (0.5 pt) | Total score (3 pts) |
| Austin | 0.5 | 0.5 | 1 | 0.5 | 0.5 | 3 |
| Chicago | 0.5 | 0.5 | 1 | 0.5 | 0.5 | 3 |
| Denver | 0.5 | 0.5 | 1 | 0.5 | 0.5 | 3 |
| Los Angeles | 0.5 | 0.5 | 1 | 0.5 | 0.5 | 3 |
| Minneapolis | 0.5 | 0.5 | 1 | 0.5 | 0.5 | 3 |
| Pittsburgh | 0.5 | 0.5 | 1 | 0.5 | 0.5 | 3 |
| Portland | 0.5 | 0.5 | 1 | 0.5 | 0.5 | 3 |

[9] Examples include ENERGY STAR® certification and Leadership in Energy and Environmental Design (LEED) certification. Previously, we reserved credit for municipal LEED requirements that emphasized energy efficiency. Recent studies have shown that LEED-certified buildings consume less energy than their traditional counterparts (General Services Administration 2011; Winters, Sigmon, and Burt 2014). In addition, the US Green Building Council recently updated LEED (v4) to emphasize ongoing building operations and hold buildings to increasingly stringent minimum energy performance requirements. As a result, we broadened our treatment of LEED by crediting cities with LEED Silver, LEED Gold, and LEED Platinum requirements.

| City | Fleet efficiency and vehicle infrastructure | | Public lighting | New buildings and equipment | | Total score (3 pts) |
|---|---|---|---|---|---|---|
| | Fuel efficiency requirement (0.5 pt) | Use of fleet management software (0.5 pt) | Outdoor lighting standard (1 pt) | Above-code requirements for public buildings (0.5 pt) | Energy-efficient procurement policy (0.5 pt) | |
| Baltimore | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 2.5 |
| Boston | 0.5 | 0.5 | 1 | 0.5 | 0 | 2.5 |
| New York | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 2.5 |
| Phoenix | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 2.5 |
| Raleigh | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 2.5 |
| San Diego | 0.5 | 0 | 1 | 0.5 | 0.5 | 2.5 |
| Washington | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 2.5 |
| Atlanta | 0.5 | 0 | 0.5 | 0.5 | 0.5 | 2 |
| Dallas | 0.5 | 0 | 0.5 | 0.5 | 0.5 | 2 |
| Kansas City | 0.5 | 0.5 | 0 | 0.5 | 0.5 | 2 |
| Orlando | 0.5 | 0 | 1 | 0 | 0.5 | 2 |
| Philadelphia | 0.5 | 0 | 0.5 | 0.5 | 0.5 | 2 |
| San Francisco | 0.5 | 0 | 0.5 | 0.5 | 0.5 | 2 |
| San Jose | 0.5 | 0 | 0.5 | 0.5 | 0.5 | 2 |
| Seattle | 0.5 | 0 | 0.5 | 0.5 | 0.5 | 2 |
| Charlotte | 0.5 | 0 | 0.5 | 0 | 0.5 | 1.5 |
| Columbus | 0 | 0.5 | 0.5 | 0.5 | 0 | 1.5 |
| Houston | 0 | 0.5 | 0.5 | 0 | 0.5 | 1.5 |
| Las Vegas | 0 | 0 | 0.5 | 0.5 | 0.5 | 1.5 |
| Milwaukee | 0 | 0 | 1 | 0 | 0.5 | 1.5 |
| Providence | 0.5 | 0 | 0.5 | 0.5 | 0 | 1.5 |
| Salt Lake City | 0 | 0.5 | 0 | 0.5 | 0.5 | 1.5 |
| San Antonio | 0.5 | 0 | 0.5 | 0 | 0.5 | 1.5 |
| St. Louis | 0 | 0.5 | 0.5 | 0.5 | 0 | 1.5 |
| Cleveland | 0 | 0 | 0.5 | 0.5 | 0 | 1 |
| Detroit | 0 | 0 | 0.5 | 0 | 0.5 | 1 |
| Indianapolis | 0.5 | 0 | 0 | 0 | 0.5 | 1 |
| Jacksonville | 0 | 0 | 0 | 0.5 | 0.5 | 1 |
| Louisville | 0 | 0.5 | 0.5 | 0 | 0 | 1 |
| Miami | 0 | 0 | 0 | 0.5 | 0.5 | 1 |
| Oklahoma City | 0.5 | 0 | 0 | 0 | 0.5 | 1 |
| Richmond | 0 | 0 | 0 | 0.5 | 0.5 | 1 |
| Sacramento | 0.5 | 0 | 0 | 0 | 0.5 | 1 |
| Virginia Beach | 0 | 0 | 0.5 | 0 | 0.5 | 1 |
| Cincinnati | 0 | 0 | 0.5 | 0 | 0 | 0.5 |
| El Paso | 0 | 0 | 0.5 | 0 | 0 | 0.5 |
| Fort Worth | 0 | 0.5 | 0 | 0 | 0 | 0.5 |
| Memphis | 0 | 0.5 | 0 | 0 | 0 | 0.5 |

| City | Fleet efficiency and vehicle infrastructure | | Public lighting | New buildings and equipment | | |
|---|---|---|---|---|---|---|
| | Fuel efficiency requirement (0.5 pt) | Use of fleet management software (0.5 pt) | Outdoor lighting standard (1 pt) | Above-code requirements for public buildings (0.5 pt) | Energy-efficient procurement policy (0.5 pt) | Total score (3 pts) |
| Nashville | 0 | 0 | 0 | 0.5 | 0 | 0.5 |
| New Orleans | 0 | 0 | 0.5 | 0 | 0 | 0.5 |
| Tampa | 0 | 0 | 0 | 0.5 | 0 | 0.5 |
| Birmingham | 0 | 0 | 0 | 0 | 0 | 0 |
| Hartford | 0 | 0 | 0 | 0 | 0 | 0 |
| Riverside | 0 | 0 | 0 | 0 | 0 | 0 |

### *ASSET MANAGEMENT*

Local governments can save energy and money by managing their existing assets more efficiently. These assets—employees, buildings, and infrastructure—require large-scale, long-term investments. It is not feasible to rebuild a building to save energy or to expect employees to make energy-efficient decisions of their own accord. But cities can help save energy by systematically managing energy use and encouraging changes in employee behavior.

This subcategory covers two topics: energy benchmarking and retrofitting, and employee energy use. Cities could earn up to 2.5 points here.

#### Building Energy Benchmarking and Retrofitting

Buildings account for a large portion of city energy use, and rising energy costs are an increasing portion of cities' operating budgets. Local governments can use a variety of strategies to manage and reduce their own energy use (DOE 2014). One such strategy is building benchmarking. Benchmarking gives building managers a holistic understanding of their energy use, which helps inform prudent, cost-effective changes to building operations.

Another proven strategy is to implement a comprehensive retrofit policy. Cities can use benchmarking results and additional assessments like building audits to help develop an energy-saving retrofit plan tailored to individual buildings and to prioritize future capital investments. The efficiency opportunities cities uncover through benchmarking and achieve through retrofitting can help bring down energy costs.

Cities could score a total of 2 points for benchmarking and comprehensive retrofit policies. We awarded up to 1 point on the percentage of municipal building floor area cities currently have benchmarked, described in table 10. Many cities could not provide data on the percentage of square feet benchmarked, so we included some flexibility in our scoring, awarding 0.5 points to cities that reported benchmarking the majority of their buildings.

Local governments with a portfolio-wide retrofit strategy received a full point. These strategies must incorporate both capital improvements (e.g., equipment replacement, building shell upgrades) and operational improvements (e.g., active energy management, audits, and retrocommissioning) customized to specific buildings. Cities that have made

some significant building efficiency investments (through an energy services company or otherwise) received half credit (0.5 points).

Tables 12 and 13 summarize our scoring methodologies for building retrofitting and building energy benchmarking.

**Table 12. Scoring for municipal building energy retrofit strategies**

| Building energy retrofit strategy | Score (1 pt) |
|---|---|
| City has a comprehensive retrofit strategy that covers all municipal buildings and includes building-specific operational and capital improvement actions. | 1 |
| City has made significant energy efficiency investments but does not have a comprehensive strategy. | 0.5 |
| City has not made significant recent investments in energy efficiency in municipal buildings. | 0 |

**Table 13. Scoring for municipal building energy benchmarking**

| % of building square footage benchmarked | Score (1 pt) |
|---|---|
| At least 75% | 1 |
| 50–74.9% | 0.5 |
| 0–49.9% | 0 |

### Public Workforce Commuting

Employee behavior is a major factor in municipal energy consumption. We allocated 0.5 points to this topic. Public employees can reduce stress on a city's transportation infrastructure and can save energy in municipal operations by reducing the number of times they commute to work (Laitner, Partridge, and Vittore 2012). Cities could earn 0.5 points for having teleworking or flex-schedule policies or otherwise minimizing the number of commutes by employees.

### Scores

Table 14 shows the details of city scores for asset management.

**Table 14. Asset management scores**

| City | Building energy benchmarking (1 pt) | Comprehensive retrofit strategy (1 pt) | Public workforce commuting (0.5 pt) | Total score (2.5 pts) |
|---|---|---|---|---|
| Atlanta | 1 | 1 | 0.5 | 2.5 |
| Charlotte | 1 | 1 | 0.5 | 2.5 |
| Denver | 1 | 1 | 0.5 | 2.5 |
| Houston | 1 | 1 | 0.5 | 2.5 |
| Los Angeles | 1 | 1 | 0.5 | 2.5 |
| New York | 1 | 1 | 0.5 | 2.5 |
| Philadelphia | 1 | 1 | 0.5 | 2.5 |
| San Antonio | 1 | 1 | 0.5 | 2.5 |
| Seattle | 1 | 1 | 0.5 | 2.5 |
| Washington | 1 | 1 | 0.5 | 2.5 |

| City | Building energy benchmarking (1 pt) | Comprehensive retrofit strategy (1 pt) | Public workforce commuting (0.5 pt) | Total score (2.5 pts) |
|---|---|---|---|---|
| Austin | 1 | 0.5 | 0.5 | 2 |
| Baltimore | 1 | 1 | 0 | 2 |
| Boston | 1 | 1 | 0 | 2 |
| Minneapolis | 1 | 0.5 | 0.5 | 2 |
| Orlando | 1 | 1 | 0 | 2 |
| Phoenix | 1 | 0.5 | 0.5 | 2 |
| Pittsburgh | 0.5 | 1 | 0.5 | 2 |
| Providence | 1 | 1 | 0 | 2 |
| Richmond | 1 | 0.5 | 0.5 | 2 |
| Salt Lake City | 0.5 | 1 | 0.5 | 2 |
| San Diego | 1 | 0.5 | 0.5 | 2 |
| San Francisco | 1 | 0.5 | 0.5 | 2 |
| Virginia Beach | 1 | 0.5 | 0.5 | 2 |
| Chicago | 0.5 | 1 | 0 | 1.5 |
| Cleveland | 1 | 0 | 0.5 | 1.5 |
| Columbus | 1 | 0.5 | 0 | 1.5 |
| Dallas | 0.5 | 0.5 | 0.5 | 1.5 |
| El Paso | 0.5 | 1 | 0 | 1.5 |
| Fort Worth | 0.5 | 1 | 0 | 1.5 |
| Kansas City | 1 | 0.5 | 0 | 1.5 |
| Las Vegas | 0.5 | 0.5 | 0.5 | 1.5 |
| Milwaukee | 1 | 0.5 | 0 | 1.5 |
| Portland | 0 | 1 | 0.5 | 1.5 |
| Cincinnati | 0.5 | 0.5 | 0 | 1 |
| Hartford | 1 | 0 | 0 | 1 |
| Indianapolis | 0.5 | 0.5 | 0 | 1 |
| Jacksonville | 0 | 0.5 | 0.5 | 1 |
| Memphis | 1 | 0 | 0 | 1 |
| Nashville | 0 | 1 | 0 | 1 |
| New Orleans | 1 | 0 | 0 | 1 |
| Riverside | 0 | 0.5 | 0.5 | 1 |
| San Jose | 0 | 0.5 | 0.5 | 1 |
| St. Louis | 0.5 | 0.5 | 0 | 1 |
| Tampa | 0 | 0.5 | 0.5 | 1 |
| Louisville | 0 | 0 | 0.5 | 0.5 |
| Miami | 0 | 0 | 0.5 | 0.5 |
| Birmingham | 0 | 0 | 0 | 0 |
| Detroit | 0 | 0 | 0 | 0 |
| Oklahoma City | 0 | 0 | 0 | 0 |

| City | Building energy benchmarking (1 pt) | Comprehensive retrofit strategy (1 pt) | Public workforce commuting (0.5 pt) | Total score (2.5 pts) |
|---|---|---|---|---|
| Raleigh | 0 | 0 | 0 | 0 |
| Sacramento | 0 | 0 | 0 | 0 |

### *A POTENTIAL NEW METRIC: ENERGY MANAGEMENT SYSTEMS*

We update the methodology of each *Scorecard* to stay current with new, innovative policies and technologies. This year we considered crediting cities' use of technology-based energy management systems (EMSs) to reduce energy waste. Cities are increasingly looking for ways to improve their energy management practices through technological applications. EMSs give cities the tools to monitor their energy use, and in the most advanced versions, they also control it through a power management suite.

Advanced EMSs allow cities to achieve energy cost savings and other benefits that were previously not feasible. For instance, Boston has used an EMS to gain new levels of control over city assets, from individual devices such as streetlights to entire building operations. The EMS allows the city to manage site-specific energy use in real time and realize energy savings, GHG reductions, and even enhanced security. The system can even remotely turn off public lights in parks when they are no longer needed.

As part of our data collection this year, we asked sustainability managers if their city used a technology-based EMS to monitor, manage, or analyze energy use across government operations. However some managers confused the computer-based tools we were asking about with efforts to improve energy use monitoring and benchmarking systems. Part of the confusion was caused by the wording of our question, which could have been clearer.

As a result, we did not score cities on an EMS metric in this edition of the *Scorecard*. When we revisit it in future years, we will likely consider giving credit only to those advanced systems that, like Boston's, allow real-time energy management actions.

### Leading Cities: Local Government Operations

**Denver.** Denver's 2020 goals include targets to reduce energy consumed in city-operated buildings and vehicles by 20% relative to a 2012 baseline and to reduce GHG emissions from local government operations. Denver will benchmark energy use in approximately 70% of its municipal buildings as part of its participation in the DOE Better Buildings Challenge. The city has also audited and retrocommissioned more than 65 of its city buildings. To reduce energy from vehicles, Executive Order 123 established a green fleet policy requiring light-duty vehicles to be replaced by the most fuel-efficient and least polluting vehicles possible. The executive order also calls for the use of GPS tracking in city vehicles to reduce vehicle miles traveled.

**Pittsburgh.** In 2015, the city called for a 50% reduction in energy use from city government–owned facilities, fleet, and infrastructure by 2030, from a 2013 baseline. This is one of the more stringent municipal energy savings targets considered in this year's *Scorecard*. The city tracks and reports on energy and climate efforts through its annual State of Sustainability report as well as its GHG inventory, conducted every five years. Pittsburgh has also gone a long way toward increasing the efficiency of its vehicles. The city has a green purchasing policy in place and uses web-based fleet management software to manage fuel efficiency.

**Atlanta.** Atlanta has both municipal energy efficiency and GHG reduction targets of 20% by 2020, 40% by 2030, and 80% by 2040, from a 2009 baseline. The city does not have a lighting policy in place, but it has already installed LEDs in more than a third of all streetlights and plans to finish the job by the end of 2017. Atlanta requires public buildings of more than 5,000 square feet, or with costs exceeding $2 million, to meet LEED Silver standards. Additionally, the city has a procurement policy in place that requires life-cycle energy consumption and emissions to be considered before purchasing products. Atlanta also recently passed a resolution for a comprehensive energy management capital improvement strategy to reduce energy and water consumption at city-owned buildings.

# Chapter 3. Community-Wide Initiatives

Lead Author: Stefen Samarripas

## *INTRODUCTION*

Energy efficiency can address a variety of a city's needs, including climate change mitigation and adaptation, energy reliability, and economic development. For many cities, energy-saving initiatives are components of broad community-wide sustainability plans addressing long-term local priorities such as transportation, water supply issues, and public health. For other cities, these initiatives are part of energy-specific strategies developed for utility resource planning or economic development purposes. Still others pursue energy efficiency as part of or in addition to complementary climate action plans. Cities often choose to focus on several aspects of energy planning, creating policies that address energy sources as well as energy use.

Cities implement a wide array of community-facing initiatives to address energy use in buildings, neighborhoods, transportation systems, and city landscapes. Including community members and other private-sector stakeholders in these efforts allows cities to expand beyond their lead-by-example initiatives, as discussed in Chapter 2. Publicly available sustainability or energy plans allow governments to develop a unifying vision for community energy usage and to leverage outside resources—funding, staff, volunteers, knowledge—to improve energy efficiency throughout the community. For example, the city of Columbus has committed to cutting citywide energy use 20% by 2020, but to reach this goal, it needs significant support from the community. The city has therefore set a complementary goal to enroll 70% of its large buildings in the Columbus Energy Challenge, the city's building energy management training program, in order to maximize results (Columbus 2017).

Improved access to data has helped cities measure, monitor, and manage energy use in ways that would have been impossible several years ago. Community-wide energy and GHG inventories along with regular tracking of related metrics allow cities to benchmark energy usage and target specific areas where savings can be quickly achieved. Such benchmarks are made possible through city programs and policies that encourage government agencies, utility companies, and their customers to collaborate in tracking energy use across a community.[10]

## *SCORING*

This chapter focuses on actions municipalities commonly take to encourage energy efficiency, establishing community-wide goals and specific interventions that cross multiple sectors. We score cities on three community-wide metrics:

- Citywide energy efficiency–related goals and progress toward their achievement (7.5 points)

[10] Several cities have adopted policies that encourage or require building owners to report their buildings' energy use. Some utility companies now also provide customers with aggregate whole building energy data. These policies and programs are analyzed further in Chapter 5.

- City planning for distributed energy systems (district energy and combined heat and power) (2 points)
- Strategies and policies to mitigate the urban heat island effect (2.5 points)

Individual, sector-specific elements (buildings, utilities, and transportation) of community-wide initiatives are not largely considered here but are discussed in the following chapters. Nor do we consider formula-allocated grants (such as the Weatherization Assistance Program, which the federal government provides to local agencies), either here or elsewhere in the *Scorecard*. Rather, we concentrate on the role that cities themselves play in leading, funding, and implementing community-wide energy initiatives. We rely primarily on city sustainability reports and websites for information on community-wide initiatives. Responses from city sustainability staff to our data requests supplement this information.

### *RESULTS*

Austin and Minneapolis received the highest overall score for community-wide initiatives, earning maximum points in all categories. These cities have robust programs, including aggressive community-wide energy and climate goals that they are on track to meet, strategies to assist distributed energy systems planning, and multiple urban heat island mitigation policies. Portland and Washington, DC, received the second-highest score for community-wide initiatives. While these cities do not have the most stringent goals, they are pursuing a number of policies and programs that are achieving substantial energy savings. Los Angeles, Philadelphia, and San Francisco had the third-highest policy area score. Overall, more than half of the cities saw an increase in points compared with the previous *City Scorecard*.

Table 15 presents the scores for community-wide initiatives. We show the point allocation for individual metrics within these categories in the tables that follow in this chapter and in tables C2, C3, and C4 of Appendix C.

**Table 15. Scores for community-wide initiatives**

| City | Community-wide goals (7.5 pts) | District energy and CHP (2 pts) | Urban heat island mitigation (2.5 pts) | Total score (12 pts) |
|---|---|---|---|---|
| Austin | 7.5 | 2 | 2.5 | 12 |
| Minneapolis | 7.5 | 2 | 2.5 | 12 |
| Portland | 6.5 | 2 | 2.5 | 11 |
| Washington | 6.5 | 2 | 2.5 | 11 |
| Los Angeles | 7.5 | 0 | 2.5 | 10 |
| Philadelphia | 6.5 | 1 | 2.5 | 10 |
| San Francisco | 6.5 | 2 | 1.5 | 10 |
| Atlanta | 6.5 | 0 | 2.5 | 9 |
| Baltimore | 4.5 | 2 | 2.5 | 9 |
| Boston | 6.5 | 2 | 0.5 | 9 |
| Chicago | 4.5 | 2 | 2.5 | 9 |

| City | Community-wide goals (7.5 pts) | District energy and CHP (2 pts) | Urban heat island mitigation (2.5 pts) | Total score (12 pts) |
|---|---|---|---|---|
| Orlando | 4.5 | 2 | 2.5 | 9 |
| Pittsburgh | 5.5 | 2 | 1.5 | 9 |
| Seattle | 5.5 | 1 | 2.5 | 9 |
| New York | 4 | 2 | 2.5 | 8.5 |
| Columbus | 7.5 | 0 | 0.5 | 8 |
| Denver | 3.5 | 2 | 2.5 | 8 |
| Riverside | 6.5 | 0 | 1.5 | 8 |
| Louisville | 5 | 0 | 2.5 | 7.5 |
| San Diego | 5 | 2 | 0.5 | 7.5 |
| Kansas City | 5.5 | 0 | 1.5 | 7 |
| New Orleans | 5 | 0 | 2 | 7 |
| Phoenix | 5.5 | 1 | 0.5 | 7 |
| San Jose | 5.5 | 0 | 1.5 | 7 |
| Cincinnati | 4 | 0 | 2.5 | 6.5 |
| San Antonio | 3 | 1 | 2.5 | 6.5 |
| Sacramento | 3.5 | 0 | 2.5 | 6 |
| Salt Lake City | 3 | 0 | 2.5 | 5.5 |
| St. Louis | 4 | 1 | 0.5 | 5.5 |
| Miami | 2.5 | 0 | 2.5 | 5 |
| Tampa | 2.5 | 0 | 2.5 | 5 |
| Cleveland | 3 | 0 | 1.5 | 4.5 |
| Richmond | 3.5 | 0 | 1 | 4.5 |
| Virginia Beach | 2.5 | 0 | 1.5 | 4 |
| Houston | 1 | 0 | 2.5 | 3.5 |
| Milwaukee | 2 | 0 | 1.5 | 3.5 |
| Providence | 2 | 0 | 1.5 | 3.5 |
| Dallas | 2 | 0 | 1 | 3 |
| Jacksonville | 0 | 2 | 1 | 3 |
| Nashville | 0.5 | 0 | 2.5 | 3 |
| Charlotte | 1 | 0 | 1.5 | 2.5 |
| Las Vegas | 0 | 1 | 1.5 | 2.5 |
| Raleigh | 0.5 | 0 | 2 | 2.5 |
| Fort Worth | 0.5 | 0 | 1.5 | 2 |
| Indianapolis | 0 | 0 | 2 | 2 |
| Hartford | 0 | 0 | 1.5 | 1.5 |
| Birmingham | 0 | 0 | 1 | 1 |

| City | Community-wide goals (7.5 pts) | District energy and CHP (2 pts) | Urban heat island mitigation (2.5 pts) | Total score (12 pts) |
|---|---|---|---|---|
| El Paso | 0 | 0 | 1 | 1 |
| Memphis | 1.0 | 0 | 0 | 1 |
| Oklahoma City | 0.5 | 0 | 0 | 0.5 |
| Detroit | 0 | 0 | 0 | 0 |
| **Median** | **4** | **0** | **2** | **7** |

The maximum possible points for community-wide goals nearly doubled when the category absorbed points previously allocated to a performance management category that has since been removed. The removal of this category had little effect on scores; in fact, most cities that scored well in performance management in 2015 gained points in this *Scorecard* because they have also adopted robust community-wide goals.

Many cities in the *Scorecard* still have room for improvement in adopting and implementing community-wide energy efficiency–related goals. Some cities have such goals and are making progress toward achieving them, but others are struggling. And several other cities have not yet set community-wide energy efficiency goals. However many are taking steps to improve their scores in both the distributed energy planning and urban heat island mitigation categories.

### *COMMUNITY-WIDE ENERGY EFFICIENCY–RELATED GOALS*

Cities can coordinate several programs under a unifying policy by establishing community-wide energy efficiency–related goals. Goals provide a vision to guide the long-term sustainability of programs. Those with specific timetables and target dates allow cities to establish transparent energy-related objectives and enable regular monitoring. Cities often develop community-wide goals after a long-term planning process and outreach to diverse stakeholders, including utilities, nonprofits, the business sector, and local citizens' groups.

#### Existence of Goals

Cities could earn up to 1.5 points for formally adopting community-wide energy savings goals and up to 1 point for formally adopting community-wide climate goals—a total of 2.5 possible points.[11] We gave points for goals that aimed for specific quantitative improvements in energy efficiency, energy consumption, energy intensity, or GHG emissions. We did not give points for renewable energy or demand savings goals because these exclusively address energy generation rather than end-use efficiency.

Table 16 summarizes our scoring methodology for both community-wide energy and GHG emissions reduction targets.

[11] To be considered formally adopted, a community-wide goal must have been approved through a city council resolution or a mayor's executive order.

Table 16. Scoring for community-wide energy savings and climate change goals

| Energy savings goals | Score (1.5 pts) |
|---|---|
| The city has formally adopted a long-term, community-wide energy efficiency target for multiple private building types (residential, commercial, industrial) | 1.5 |
| The city has formally adopted a long-term, community-wide energy efficiency target for one private building type (residential, commercial, industrial) | 1 |
| The city has adopted an energy efficiency goal for a neighborhood or district; or the city has initiated a planning process to establish a community-wide energy efficiency target but has not yet formally adopted the target. | 0.5 |
| **Climate change goals** | **Score (1 pt)** |
| The city has formally adopted a long-term community-wide GHG emissions reduction target or related target. | 1 |
| The city has engaged a stakeholder group or similar planning process to set goals for GHG emissions reductions but has not yet formally adopted a target. | 0.5 |

### Stringency of Goals

Cities were eligible to earn up to 2 points based on the annual savings required to meet their most imminent community-wide energy efficiency–related goal. This metric recognizes cities that are striving to set particularly ambitious goals.

Many cities have multiple energy-related goals with different time horizons, commonly one goal to achieve savings by 2020 and another to achieve a deeper level of savings by 2050. Rather than measure annual savings against long-term targets, we chose to evaluate cities based on the annual savings required to meet their nearest-term goal. When cities had both energy efficiency and climate goals, we awarded points based on the goal with the most stringent annual target or for which multiple years of data were available.[12]

Table 17 summarizes the scoring.

Table 17. Scoring for stringency of energy savings or climate goals

| Community-wide goal stringency | Score (2 pts) |
|---|---|
| Annual savings are greater than 2% | 2 |
| Annual savings are at least 1% but less than 2% | 1 |
| Annual savings are less than 1% | 0 |

[12] There is little difference in the distribution of annual savings for climate goals and energy goals. Therefore we chose to score both types of goals using the same scale.

### Progress toward Goals

Cities could earn an additional 2 points based on their progress toward achieving their most imminent community-wide goal. To be considered on track, cities had to have demonstrated past energy savings or reductions in GHG emissions that, assuming the same annual additional savings for all future years until the goal year, would result in energy use or GHG emissions at or below the goal level in the goal year.

We summarize the methodology in table 18.

Table 18. Scoring for progress toward energy savings or climate change goals

| Progress toward community-wide goals | Score (2 pts) |
|---|---|
| The city is on track to meet or exceed its community-wide energy efficiency–related goal. | 2 |
| The city is not on track to achieve its community-wide energy efficiency–related goal, but it is projected to be within 25% of the goal. | 1 |
| The city is not on track to be within at least 25% of its community-wide energy efficiency–related goal | 0 |

We used the same approach for evaluating progress toward goals at both the local government and the community-wide level.[13] Cities that did not have quantitative data or had only aged inventories did not receive points. Cities tracking progress toward both energy efficiency and climate goals were awarded points based on the goal used for the stringency metric. Table C2 in Appendix C details each city's nearest-term community-wide goal and our projections for overall city savings.

### Public Reporting

Regular monitoring holds local governments and community members accountable. Taking a systematic approach to monitoring helps cities identify ways to improve their plans to meet goals by revising time lines or program strategies (Mackres and Kazerooni 2012). Cities that regularly released public quantitative progress reports on their energy or climate efforts received 1 point in this category.

[13] See Chapter 2 for a detailed explanation of the methodology used to calculate a city's progress toward its goals.

**Performance Management Strategies for Community-Wide Goals**

Cities with community-wide energy efficiency goals can use performance management strategies to systematically pursue, measure, and confirm success. These strategies include:

**Independent EM&V.** Allow an outside party to systematically evaluate, monitor, and verify city progress toward community-wide goals. This helps cities identify ways to improve their plans to meet goals by revising time lines or program strategies.

**Dedicated staff.** Assign full-time staff to administer community-wide energy efficiency initiatives. This can help coordinate efforts across city programs and departments to ensure goals are met.

**Dedicated funding.** Allocate a dedicated funding source for community-wide energy efficiency initiatives. Funding for these initiatives should be independent of general funds to ensure that financial support is consistent.

More information on these strategies can be found in the *2015 City Scorecard* (Ribeiro et al. 2015).

Table 19 lists city scores for community-wide energy efficiency–related goals.

**Table 19. Scores for community-wide energy efficiency–related goals**

| City | Energy savings goals (1.5 pts) | Climate change goals (1 pt) | Stringency of goals (2 pts) | Progress toward goals (2 pts) | Public reporting (1 pt) | Total score (7.5 pts) |
|---|---|---|---|---|---|---|
| Austin | 1.5 | 1 | 2 | 2 | 1 | 7.5 |
| Columbus | 1.5 | 1 | 2 | 2 | 1 | 7.5 |
| Los Angeles | 1.5 | 1 | 2 | 2 | 1 | 7.5 |
| Minneapolis | 1.5 | 1 | 2 | 2 | 1 | 7.5 |
| Atlanta | 1.5 | 1 | 1 | 2 | 1 | 6.5 |
| Boston | 1.5 | 1 | 1 | 2 | 1 | 6.5 |
| Philadelphia | 0.5 | 1 | 2 | 2 | 1 | 6.5 |
| Portland | 1.5 | 1 | 1 | 2 | 1 | 6.5 |
| Riverside | 1.5 | 1 | 1 | 2 | 1 | 6.5 |
| San Francisco | 1.5 | 1 | 1 | 2 | 1 | 6.5 |
| Washington | 1.5 | 1 | 1 | 2 | 1 | 6.5 |
| Kansas City | 1.5 | 1 | 1 | 1 | 1 | 5.5 |
| Phoenix | 1.5 | 1 | 2 | 0 | 1 | 5.5 |
| Pittsburgh | 0.5 | 1 | 1 | 2 | 1 | 5.5 |
| San Jose | 1.5 | 1 | 0 | 2 | 1 | 5.5 |
| Seattle | 1.5 | 1 | 2 | 0 | 1 | 5.5 |
| Louisville | 1.5 | 0.5 | 2 | 0 | 1 | 5 |
| New Orleans | 1.5 | 0.5 | 0 | 2 | 1 | 5 |
| San Diego | 1 | 1 | 0 | 2 | 1 | 5 |

| City | Energy savings goals (1.5 pts) | Climate change goals (1 pt) | Stringency of goals (2 pts) | Progress toward goals (2 pts) | Public reporting (1 pt) | Total score (7.5 pts) |
|---|---|---|---|---|---|---|
| Baltimore | 1.5 | 1 | 1 | 0 | 1 | 4.5 |
| Chicago | 0.5 | 1 | 1 | 1 | 1 | 4.5 |
| Orlando | 1.5 | 1 | 2 | 0 | 0 | 4.5 |
| Cincinnati | 0 | 1 | 2 | 0 | 1 | 4 |
| New York | 0 | 1 | 2 | 0 | 1 | 4 |
| St. Louis | 0 | 1 | 2 | 0 | 1 | 4 |
| Denver | 1.5 | 1 | 0 | 0 | 1 | 3.5 |
| Richmond | 0 | 0.5 | 2 | 0 | 1 | 3.5 |
| Sacramento | 1.5 | 1 | 1 | 0 | 0 | 3.5 |
| Cleveland | 0.5 | 0.5 | 1 | 0 | 1 | 3 |
| Salt Lake City | 0 | 1 | 1 | 0 | 1 | 3 |
| San Antonio | 1.5 | 0.5 | 0 | 0 | 1 | 3 |
| Miami | 0.5 | 1 | 1 | 0 | 0 | 2.5 |
| Tampa | 0.5 | 1 | 0 | 0 | 1 | 2.5 |
| Virginia Beach | 1.5 | 0 | 0 | 0 | 1 | 2.5 |
| Dallas | 0.5 | 0.5 | 0 | 0 | 1 | 2 |
| Milwaukee | 1 | 0 | 0 | 0 | 1 | 2 |
| Providence | 0 | 1 | 0 | 0 | 1 | 2 |
| Charlotte | 0 | 0 | 0 | 0 | 1 | 1 |
| Houston | 0.5 | 0.5 | 0 | 0 | 0 | 1 |
| Memphis | 0.5 | 0.5 | 0 | 0 | 0 | 1 |
| Fort Worth | 0.5 | 0 | 0 | 0 | 0 | 0.5 |
| Nashville | 0 | 0.5 | 0 | 0 | 0 | 0.5 |
| Oklahoma City | 0.5 | 0 | 0 | 0 | 0 | 0.5 |
| Raleigh | 0 | 0.5 | 0 | 0 | 0 | 0.5 |
| Birmingham | 0 | 0 | 0 | 0 | 0 | 0 |
| Detroit | 0 | 0 | 0 | 0 | 0 | 0 |
| El Paso | 0 | 0 | 0 | 0 | 0 | 0 |
| Hartford | 0 | 0 | 0 | 0 | 0 | 0 |
| Indianapolis | 0 | 0 | 0 | 0 | 0 | 0 |
| Jacksonville | 0 | 0 | 0 | 0 | 0 | 0 |
| Las Vegas | 0 | 0 | 0 | 0 | 0 | 0 |

### *EFFICIENT DISTRIBUTED ENERGY SYSTEMS: DISTRICT ENERGY AND COMBINED HEAT AND POWER*

District energy systems produce steam, hot water, or chilled water at a central plant. Buildings served by district energy systems often do not need their own heating and cooling equipment. Instead they rely on efficient generation serving larger populations. Furthermore, buildings connected to district energy systems can use energy sources often unavailable to individual buildings. Well-designed and -operated district energy systems can convey to users significant efficiency benefits, such as reduced energy use, lower energy costs, and reliability in the face of disaster (Chittum 2012a). Because one-third of US energy consumption goes to industrial processes and the heating and cooling of buildings, district energy systems can drastically decrease community-wide energy use in large buildings (Chittum 2012b).

District energy systems provide the infrastructure needed to bring clean energy and improved efficiency to many sites, but their efficiency varies by system type. When paired with combined heat and power (CHP), also known as cogeneration, district energy systems waste much less energy than traditional power plants. A typical US fossil-fueled power plant wastes 67% of its fuel in the form of heat, but district energy systems with CHP turn most of that waste heat into useful energy for heating and cooling, with as little as 20% of generated energy lost as waste heat (EPA 2014). District energy with CHP also offers a source of energy that is highly reliable, a benefit that was made clear in the aftermath of Superstorm Sandy in October 2012. More than eight million utility customers lost power in the storm, but businesses, universities, and hospitals with CHP kept their occupants comfortable and the lights on by disconnecting from the grid and continuing to generate heat and power for their connected buildings (CHP Association 2012).

There are major opportunities for cities to develop new district energy systems or expand existing ones. While many district energy and CHP systems are privately owned, cities can help incentivize the construction of more. Cities can proactively identify high-priority areas for district energy systems, lead planning and feasibility studies, encourage compatibility with district energy in new buildings, and facilitate district energy and CHP through zoning and permitting (Portland 2011; EPA 2015a). For example, city government in Baltimore is helping to create and expand CHP systems throughout the city by providing both investment funds and planning assistance in targeted locations (Baltimore 2016b). Cities can also tie district energy incentives into climate and energy plans, but few are doing so yet.

Cities could earn 2 points for efficient distributed energy systems planning. We awarded 1 point to cities that had improved their local capacity for district energy systems. Cities could also earn 1 point if they had dedicated city resources to assisting other community actors with planning for a district energy system. The scoring methodology for these metrics is described in more detail in table 20. Table 21 presents city scores for this category.

Table 20. Scoring for distributed energy systems planning

| Improved city capacity for district energy and CHP (activities eligible for point) | Score (1 pt) |
|---|---|
| • The city has identified high-priority areas for potential new district energy systems.<br>• The city has developed recommended standards for designing building heating, ventilation, and air-conditioning systems to ensure compatibility with future district energy systems.<br>• The city has targeted an area for an ecodistrict or a similar district with an energy focus. | 1 |
| **Coordinated planning for district energy and CHP (activities eligible for point)** | **Score (1 pt)** |
| • The city has developed a program or policy within one or more city agencies (e.g., planning, housing, or development authority) to integrate CHP and/or district energy into future projects.<br>• The city has dedicated city staff to district energy planning and development.<br>• The city has developed at least one integrated energy master plan for a high-priority area. | 1 |

Table 21. Scores for efficient distributed energy systems

| City | Improved city capacity for distributed energy systems | Coordinated planning for distributed energy systems | Total score (2 pts) |
|---|---|---|---|
| Austin | • | • | 2 |
| Baltimore | • | • | 2 |
| Boston | • | • | 2 |
| Chicago | • | • | 2 |
| Denver | • | • | 2 |
| Jacksonville | • | • | 2 |
| Minneapolis | • | • | 2 |
| New York | • | • | 2 |
| Orlando | • | • | 2 |
| Pittsburgh | • | • | 2 |
| Portland | • | • | 2 |
| San Diego | • | • | 2 |
| San Francisco | • | • | 2 |
| Washington | • | • | 2 |
| Las Vegas | • | | 1 |
| Philadelphia | • | | 1 |
| Phoenix | | • | 1 |
| San Antonio | | • | 1 |

| City | Improved city capacity for distributed energy systems | Coordinated planning for distributed energy systems | Total score (2 pts) |
|---|---|---|---|
| Seattle | | • | 1 |
| St. Louis | | • | 1 |
| Atlanta | | | 0 |
| Birmingham | | | 0 |
| Charlotte | | | 0 |
| Cincinnati | | | 0 |
| Cleveland | | | 0 |
| Columbus | | | 0 |
| Dallas | | | 0 |
| Detroit | | | 0 |
| El Paso | | | 0 |
| Fort Worth | | | 0 |
| Hartford | | | 0 |
| Houston | | | 0 |
| Indianapolis | | | 0 |
| Kansas City | | | 0 |
| Los Angeles | | | 0 |
| Louisville | | | 0 |
| Memphis | | | 0 |
| Miami | | | 0 |
| Milwaukee | | | 0 |
| Nashville | | | 0 |
| New Orleans | | | 0 |
| Oklahoma City | | | 0 |
| Providence | | | 0 |
| Raleigh | | | 0 |
| Richmond | | | 0 |
| Riverside | | | 0 |
| Sacramento | | | 0 |
| Salt Lake City | | | 0 |
| San Jose | | | 0 |
| Tampa | | | 0 |
| Virginia Beach | | | 0 |

### *MITIGATION OF URBAN HEAT ISLANDS*

Unvegetated and impermeable surfaces in cities are substantial contributors to the urban heat island effect. This occurs when city buildings, parking lots, and streets absorb more heat than surrounding rural areas where moist, vegetated surfaces release water vapor and trees provide shade to cool the surrounding air. Consequently, air temperatures in cities can be as much as 22°F warmer than surrounding rural areas (EPA 2016d). Urban heat islands increase the demand for electric cooling, resulting in increased power plant–related air pollution and waste heat. In response, cities are establishing goals and implementing a variety of programs and policies to mitigate the urban heat island effect.

Cities with land development policies that increase or preserve vegetated land, reduce stormwater runoff, and protect wetlands can reduce the energy needed to cool buildings and run wastewater treatment plants (Stone 2012). Cities can also require or incentivize property owners to install cool roofs and use pavements with highly reflective coatings to reflect solar energy rather than absorb it. These measures also reduce a building's energy use and a city's peak energy demand (EPA 2016c).

Cities could earn up to 2.5 points for efforts to reduce their urban heat island effect. Cities that have a quantitative goal to mitigate this effect, such as an urban tree canopy or temperature-reduction target, earned 0.5 points. This goal must be integrated as part of a formal city plan or program to receive credit, however. Cities could also receive 1 point for each adopted policy that incorporates private-sector requirements or incentives to mitigate the urban heat island effect, up to a total of 2 points.[14] The scoring methodology for these metrics is described in more detail in table 22. Table 23 provides the score totals for each city. Further details on scoring for urban heat island goals and initiatives are presented in table C4 in Appendix C.

[14] Cities did not receive points for green building codes or programs, as these are credited under Buildings Policies (Chapter 4). Public-sector stormwater management planning is credited under Energy and Water Utilities (Chapter 5).

Table 22. Scoring for urban heat island mitigation goals and policies for privately owned property

| Urban heat island mitigation goal | Score (0.5 pts) |
|---|---|
| The city has adopted an urban heat island mitigation goal as part of an official city planning document or program. This goal may specify reductions in temperature or impermeable surfaces, or increases in urban tree canopy or wetlands. | 0.5 |
| **Urban heat island mitigation policy categories** | **Score (2 pts)** |
| • Private low-impact development (LID) policy. Includes LID stormwater management requirements or incentives, cool roof/pavement policies, and green roof policies.<br>• Private tree protection ordinance. Includes tree ordinances that require a permit to remove existing trees on private property undergoing development.<br>• Private land conservation policy. Includes conservation subdivision ordinances, cluster house zoning, transfer of development rights policies, and incentives for natural land conservation or restoration. | 1 per category |

While many of the of the urban heat island mitigation measures listed here have been shown to reduce land surface temperature in cities, the actual temperature reduction can vary based on several locational factors. Additionally, while multiple studies have investigated the temperature-reduction potential of some low-impact development and land conservation measures, other measures have been examined only sparingly.

Table 23 lists scores for urban heat island mitigation goals and strategies.

Table 23. Scores for urban heat island mitigation goals and strategies

| City | Urban heat island goals (0.5 pts) | Urban heat island policies (2 pts) | Total score (2.5 pts) |
|---|---|---|---|
| Atlanta | 0.5 | 2 | 2.5 |
| Austin | 0.5 | 2 | 2.5 |
| Baltimore | 0.5 | 2 | 2.5 |
| Chicago | 0.5 | 2 | 2.5 |
| Cincinnati | 0.5 | 2 | 2.5 |
| Denver | 0.5 | 2 | 2.5 |
| Houston | 0.5 | 2 | 2.5 |
| Los Angeles | 0.5 | 2 | 2.5 |
| Louisville | 0.5 | 2 | 2.5 |
| Miami | 0.5 | 2 | 2.5 |
| Minneapolis | 0.5 | 2 | 2.5 |
| Nashville | 0.5 | 2 | 2.5 |
| New York | 0.5 | 2 | 2.5 |
| Orlando | 0.5 | 2 | 2.5 |
| Philadelphia | 0.5 | 2 | 2.5 |
| Portland | 0.5 | 2 | 2.5 |

| City | Urban heat island goals (0.5 pts) | Urban heat island policies (2 pts) | Total score (2.5 pts) |
|---|---|---|---|
| Sacramento | 0.5 | 2 | 2.5 |
| Salt Lake City | 0.5 | 2 | 2.5 |
| San Antonio | 0.5 | 2 | 2.5 |
| Seattle | 0.5 | 2 | 2.5 |
| Tampa | 0.5 | 2 | 2.5 |
| Washington | 0.5 | 2 | 2.5 |
| Indianapolis | 0 | 2 | 2 |
| New Orleans | 0 | 2 | 2 |
| Raleigh | 0 | 2 | 2 |
| Charlotte | 0.5 | 1 | 1.5 |
| Cleveland | 0.5 | 1 | 1.5 |
| Fort Worth | 0.5 | 1 | 1.5 |
| Hartford | 0.5 | 1 | 1.5 |
| Kansas City | 0.5 | 1 | 1.5 |
| Las Vegas | 0.5 | 1 | 1.5 |
| Milwaukee | 0.5 | 1 | 1.5 |
| Pittsburgh | 0.5 | 1 | 1.5 |
| Providence | 0.5 | 1 | 1.5 |
| Riverside | 0.5 | 1 | 1.5 |
| San Francisco | 0.5 | 1 | 1.5 |
| San Jose | 0.5 | 1 | 1.5 |
| Virginia Beach | 0.5 | 1 | 1.5 |
| Birmingham | 0 | 1 | 1 |
| Dallas | 0 | 1 | 1 |
| El Paso | 0 | 1 | 1 |
| Jacksonville | 0 | 1 | 1 |
| Richmond | 0 | 1 | 1 |
| Boston | 0.5 | 0 | 0.5 |
| Columbus | 0.5 | 0 | 0.5 |
| Phoenix | 0.5 | 0 | 0.5 |
| San Diego | 0.5 | 0 | 0.5 |
| St. Louis | 0.5 | 0 | 0.5 |
| Detroit | 0 | 0 | 0 |
| Memphis | 0 | 0 | 0 |
| Oklahoma City | 0 | 0 | 0 |

### Leading Cities: Community-Wide Initiatives

**Austin.** Austin is one of only a handful of cities that have established community-wide goals for both energy efficiency and GHG emissions. The city has adopted a goal to achieve zero net GHG emissions by 2050 and is currently on track to surpass its short-term goal of a 25% reduction by 2020. The city is working with Austin Energy to construct district energy systems in several targeted redevelopment zones. Austin is also mitigating the urban heat island effect with policies that require cool roofs and protection of trees on private land while incentivizing green roofs and land conservation.

**Seattle.** Seattle has set specific, complementary goals for GHG emissions and energy efficiency. The city has a goal to reduce GHG emissions 82% by 2050. To achieve this, the city's Climate Action Plan calls for a 45% reduction in commercial-sector energy use and a 63% reduction in residential-sector energy use. Seattle is one of the few cities in the *Scorecard* that require developers to incorporate low-impact measures in site development. The city also has an aggressive private tree protection ordinance and incentives for developers to permanently preserve land in exchange for building height bonuses.

**Pittsburgh.** Pittsburgh has signed an agreement with the US Department of Energy (DOE) to coordinate on substantially expanding the city's district energy systems. The city will work with DOE to complete an energy master plan, governance and business case model, and development pathway for district energy systems in multiple neighborhoods throughout the city. The city's goal is to create one of the largest district energy ecosystems in North America and to use these new investments to increase resilience, reduce consumers' energy cost burden, and encourage workforce development. City programs such as these are helping Pittsburgh stay on track to meet its goal of reducing GHG emissions 20% by 2023.

# Chapter 4. Buildings Policies

Lead Author: Jen King

## *INTRODUCTION*

Buildings are big energy users in cities, and as such they are clear targets for achieving energy savings. Establishment and enforcement of policies that relate to land use and buildings are two of the core authorities of local governments. Therefore they control many energy-related buildings policies. Some policies that affect buildings are determined at the state level, but many cities have gone above and beyond state requirements to meet city-determined objectives for reducing energy use and GHG emissions.

Buildings' energy use and GHG emissions are a particularly important target in large, dense cities. In these cities, relatively low levels of industrial activity and well-developed alternatives to car transportation often result in lower-than-average energy use in those sectors. As a result, buildings account for a disproportionate share of the emissions, energy use, and energy savings opportunities in large cities, as compared with the nation as a whole. Whereas the proportion of buildings' energy consumption and carbon dioxide emissions in the United States is 40%, the share of carbon pollution for buildings in the country's largest cities is 50–75% (EIA 2016b; EPA 2016a; NRDC and IMT 2016b). For the 17 cities for which we were able to gather detailed energy consumption data (see Chapter 7), buildings accounted for an average of 64% of energy use. Even though the physical characteristics of American cities vary, all have buildings they can target as they adopt energy and emissions reduction goals to improve the energy performance of their communities.

In this chapter we focus on policies applying to residential and commercial buildings in the private sector. Many cities start by adopting policies for municipal buildings and then, after demonstrating energy improvements in local government operations, extend the policies to private buildings. Chapter 2 assesses energy efficiency policies and goals that local governments have established for their own operations, including buildings. In Chapter 3, we evaluate comprehensive, community-wide energy efficiency targets that frequently incorporate private building performance. In fact, buildings-related metrics figure to some degree in all chapters of the *City Scorecard*. When we add these metrics to the ones that focus specifically on the buildings sector, we find that energy efficiency policies that apply to buildings account for more than two-thirds of the total possible points in the *2017 City Scorecard*.

## *SCORING*

We scored cities on energy efficiency policies for private buildings that local governments can directly establish or influence. We allocated 28 points to the buildings policy area across these four categories:

- Stringency of residential and commercial building codes (8 points)
- Residential and commercial energy code compliance and enforcement efforts (6 points)
- Incentives and requirements for efficient buildings (8 points)

- Requirements for commercial and residential building benchmarking, rating, and/or energy use transparency (6 points)

We discuss the scoring methodology and data sources for each metric following the presentation of results.

### *RESULTS*

A number of cities are paving the way with aggressive policies that address high energy consumption in buildings. Boston, Los Angeles, Austin, New York, and Seattle have the highest scores for buildings policies, with Boston earning the most points, 26 out of 28. Boston received full credit in code stringency and in benchmarking, rating, and transparency. Since 2016, Boston's Building Energy Reporting and Disclosure ordinance has mandated that all buildings in the city greater than 35,000 square feet benchmark and report their energy and water use. The city enforces the Massachusetts Stretch Energy Code and requires building performance testing and verification of compliance.

As shown in table 24 below by the narrow point spread between their scores, the five top-scoring cities are all seeking to reduce energy consumption in pursuit of their energy and emissions reductions goals. Only 0.5 points separate the highest and second-highest scores, and only 2 points separate the highest and the fifth-highest. The top five cities all earned more than 20 points, well above the median of 10.5 points out of 28. The top-scoring cities can serve as great models for other cities while continuing to look for opportunities to advance their own energy efficiency policies going forward.

This year we have two new cities among the five top scorers for buildings policies, Los Angeles and Austin, which tied for second place at 25.5 points each. Los Angeles earned 13.5 more points than in the last edition of the *City Scorecard* and received full credit in code stringency and in incentives and requirements. Los Angeles's improvement is largely due to the city's recent development of its Existing Building Energy and Water Efficiency (EBEWE) program. This program includes energy audit, retrofit, and benchmarking requirements for commercial and residential buildings, effective January 29, 2017 (Los Angeles 2016a). Like all California cities, Los Angeles enforces the 2016 California Energy Code and 2016 California Green Building Standards Code, both effective January 1, 2017 (CBSC 2016). The city has also enforced strengthening amendments to the existing 2013 California Green Building Code since January 2014 (Los Angeles 2013).

Austin moved up five spots in building policies, earning 4 more points than in the last edition. In late 2016, the city adopted the most current (2015) version of the model energy code for residential and commercial buildings. Austin also added local amendments to strengthen the code (Austin 2016). The city's steady leadership in energy efficiency policy is attributable to its longstanding energy audit, benchmarking, and green building programs.

Overall, cities performed better in some categories than in others. They scored best in code stringency, earning a median score of 5.5 of 8 possible points. They scored lowest in buildings benchmarking, rating, and transparency, with a median score of 0.5 points out of 6. Less than half of the cities have benchmarking policies. Cities also have room to improve their energy code compliance efforts and energy efficiency incentives and requirements.

Table 24 summarizes the scores across all buildings policies categories.

**Table 24. Buildings policies scores**

| City | Code stringency (8 pts) | Code compliance & enforcement (6 pts) | Incentives & requirements (8 pts) | Benchmarking, rating, & transparency (6 pts) | Total score (28 pts) |
|---|---|---|---|---|---|
| Boston | 8 | 5 | 7 | 6 | 26 |
| Austin | 8 | 5 | 6.5 | 6 | 25.5 |
| Los Angeles | 8 | 4.5 | 8 | 5 | 25.5 |
| New York | 8 | 6 | 5 | 6 | 25 |
| Seattle | 8 | 6 | 4 | 6 | 24 |
| Washington | 3.5 | 6 | 4.5 | 6 | 20 |
| Denver | 6.5 | 5 | 2.5 | 5.5 | 19.5 |
| San Francisco | 8 | 1.5 | 6.5 | 3.5 | 19.5 |
| Chicago | 6 | 4.5 | 2 | 6 | 18.5 |
| Phoenix | 4 | 5.5 | 4 | 3.5 | 17 |
| Portland | 6 | 3 | 3 | 5 | 17 |
| Philadelphia | 5 | 2 | 3.5 | 6 | 16.5 |
| Pittsburgh | 4.5 | 5.5 | 3.5 | 2.5 | 16 |
| Minneapolis | 6 | 2 | 3 | 3.5 | 14.5 |
| San Diego | 8 | 4 | 2 | 0.5 | 14.5 |
| Houston | 6 | 5 | 2.5 | 0.5 | 14 |
| Orlando | 3 | 1.5 | 4 | 5.5 | 14 |
| Baltimore | 6 | 3 | 4 | 0.5 | 13.5 |
| Kansas City | 3.5 | 3 | 1.5 | 5.5 | 13.5 |
| San Jose | 8 | 1 | 4 | 0.5 | 13.5 |
| Tampa | 7 | 3 | 1.5 | 0.5 | 12 |
| Dallas | 6 | 1.5 | 3 | 0.5 | 11 |
| Fort Worth | 6 | 4.5 | 0 | 0.5 | 11 |
| Riverside | 8 | 0 | 2.5 | 0.5 | 11 |
| Richmond | 6 | 3 | 1 | 0.5 | 10.5 |
| Virginia Beach | 6 | 3 | 1 | 0.5 | 10.5 |
| Atlanta | 0.5 | 5 | 1.5 | 3 | 10 |
| Sacramento | 8 | 0 | 1 | 0.5 | 9.5 |
| Columbus | 5.5 | 2 | 1 | 0.5 | 9 |
| Nashville | 3 | 4 | 1.5 | 0.5 | 9 |
| Cincinnati | 5.5 | 1 | 1.5 | 0.5 | 8.5 |
| Cleveland | 5.5 | 0 | 2.5 | 0.5 | 8.5 |
| Las Vegas | 3.5 | 4 | 0.5 | 0.5 | 8.5 |

| City | Code stringency (8 pts) | Code compliance & enforcement (6 pts) | Incentives & requirements (8 pts) | Benchmarking, rating, & transparency (6 pts) | Total score (28 pts) |
|---|---|---|---|---|---|
| San Antonio | 6 | 1 | 1 | 0.5 | 8.5 |
| El Paso | 6 | 0 | 1 | 0.5 | 7.5 |
| New Orleans | 0 | 6 | 1 | 0.5 | 7.5 |
| Salt Lake City | 4 | 0 | 2.5 | 0.5 | 7 |
| Indianapolis | 0 | 3 | 3 | 0.5 | 6.5 |
| Milwaukee | 4 | 0 | 2.5 | 0 | 6.5 |
| Raleigh | 1.5 | 4.5 | 0 | 0.5 | 6.5 |
| Miami | 3 | 0 | 2.5 | 0.5 | 6 |
| St. Louis | 0 | 0 | 2.5 | 3.5 | 6 |
| Jacksonville | 3 | 1.5 | 0 | 0.5 | 5 |
| Detroit | 3 | 0 | 1.5 | 0 | 4.5 |
| Louisville | 1 | 1 | 2 | 0.5 | 4.5 |
| Hartford | 2 | 1 | 0 | 0.5 | 3.5 |
| Memphis | 0 | 0 | 2 | 0.5 | 2.5 |
| Charlotte | 1.5 | 0 | 0 | 0.5 | 2 |
| Providence | 2 | 0 | 0 | 0 | 2 |
| Oklahoma City | 0 | 0 | 0.5 | 0.5 | 1 |
| Birmingham | 0 | 0 | 0 | 0.5 | 0.5 |
| **Median** | 5.5 | 2 | 2 | 0.5 | 10.5 |

### *STRINGENCY OF BUILDING ENERGY CODES*

New buildings are a critical target for energy savings in the buildings sector. A building's energy efficiency can be addressed more cost effectively when the building is being constructed than by retrofitting it with efficiency measures later on. Mandatory building energy codes are one mechanism for improving the efficiency of new buildings and those undergoing major renovation. The United States does not have a uniform national building energy code, but the federal government has taken an active role in developing national model energy codes. The national model code for residential buildings is the International Energy Conservation Code (IECC), developed by the International Code Council (ICC). The national model code for commercial buildings is the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 90.1, developed jointly by ASHRAE and the Illuminating Engineering Society.[15] The federal government encourages state governments to adopt and implement codes and to provide training,

[15] The current model energy codes set by DOE are the 2015 IECC and the ASHRAE 90.1-2013 standards. Code stringency increases more significantly in some years than in others within each code cycle. Between 1992 and 2012, the energy codes accounted for 4.2 quads of energy savings. By 2040, increased stringency and adoption of the energy codes could save an additional 41.6 quads of energy and 6.2 billion tons of $CO_2$ (Livingston et al. 2014).

education, and tools to help state and local agencies and contractors meet code requirements (Levine et al. 2012).

Local jurisdictions can take active roles in developing national model energy codes through the ICC. City officials can advocate for and vote on changes to the model codes. They can participate in the council's public comment hearings and voting process to determine which code-change proposals are adopted into the next version of the model energy codes.

### Code Adoption

Cities could earn a maximum of 4 points for residential code stringency and 4 points for commercial code stringency. In this year's *City Scorecard*, all cities have commercial and residential energy codes, but their stringency varies significantly. Codes are adopted through legislative action, regulatory action by administrative agencies, or action by code adoption boards at either the state or local level. The relationship between state and local governments in terms of code adoption authority varies from state to state. In scoring code stringency, we took this relationship into account because it affects how much flexibility cities have to adopt their own energy codes.

We developed three scoring paths based on code adoption authority, with slight variations for residential and commercial stringency. Track 1 scoring is for cities that do not have the authority to adopt their own codes and must follow the code set by the state. Cities in this track can receive points for actively advocating for code improvements at the state level. We determined this activity based on cities' official participation in technical advisory groups for building code development, public comments submitted in support of code upgrades during the state code-change rulemaking process, and/or active advocacy or lobbying efforts.

Track 2 scoring is for cities where a code is set at the state level but local adoption of more stringent codes is permitted, usually as amendments specific to the city and/or a more stringent stretch code. If a city had the authority to adopt codes and used it, we awarded points based on the stringency of the city's code (track 2A). If a city had the authority but did not use it, we awarded a reduced number of points based on the stringency of the state code (track 2B).

Track 3 scoring is for cities in states that do not have a statewide energy code but where municipalities can adopt their own. In these cases, cities can serve as leaders in code adoption. This is common in growing metropolitan areas, where a majority of the construction in states occurs.

In addition, cities could receive a half-point bonus if they actively participate in the ICC model energy code development process. We awarded this bonus to cities that had not already achieved the 8-point maximum for the category.

Table 25 summarizes the various scoring paths.

**Table 25. Scoring on code stringency**

| Track | Authority | Residential scoring | Commercial scoring |
|---|---|---|---|
| Track 1 | IF CODE CAN BE SET ONLY BY THE STATE:<br>Points are awarded based on the state-adopted codes that are applicable in the city. | ≥ 2015 IECC = 2 pts<br>> 2012 IECC = 1.5 pts<br>2012 IECC = 1 pt<br>< 2012 IECC and > 2009 IECC = 0.5 pts<br>≤ 2009 IECC, no mandatory code, or state does not set codes = 0 pts | ≥ 2015 IECC or ASHRAE 2013 = 2 pts<br>> 2012 IECC or ASHRAE 2010 = 1.5 pts<br>2012 IECC or ASHRAE 2010 = 1 pt<br>< 2012 IECC or ASHRAE 2010, no mandatory code, or state does not set codes = 0 pts |
| | PLUS:<br>Additional points are available to a city in a state with code authority when the city is an active advocate for energy code improvements. | Documented state energy code advocacy by city = 2 pts | Documented state energy code advocacy by city = 2 pts |
| Track 2 | *(A)* IF LOCAL AUTHORITY IS PERMITTED AND USED:<br>If a city adopted stretch codes (either city- or state-designed) or the city energy codes otherwise vary from the state codes, points are awarded based on the stringency of the locally adopted code. | > 2015 IECC = 4 pts<br>2015 IECC = 3 pts<br>≥ 2012 IECC = 2 pts<br>< 2012 IECC and > 2009 IECC = 1 pt<br>< or equal to 2009 IECC or less stringent than state code = 0 pts | > 2015 IECC or ASHRAE 2013 = 4 pts<br>2015 IECC or ASHRAE 2013 = 3 pts<br>≥ 2012 IECC or ASHRAE 2010 = 1.5 pts<br>< 2012 IECC or ASHRAE 2010 or less stringent than state code = 0 pts |
| | *(B)* IF LOCAL AUTHORITY IS NOT USED:<br>If the city is permitted to amend its codes but has not used this authority, fewer points are awarded based on the stringency of the state code. | ≥ 2015 IECC = 2 pts<br>> 2012 IECC = 1.5 pts<br>2012 IECC = 1 pt<br>< 2012 IECC and > 2009 IECC = 0.5 pts<br>≤ 2009 IECC or no mandatory code = 0 pts | ≥ 2015 IECC or ASHRAE 2013 = 2 pts<br>> 2012 IECC or ASHRAE 2010 = 1.5 pts<br>2012 IECC or ASHRAE 2010 = 1 pt<br>< 2012 IECC or ASHRAE 2010 or no mandatory code = 0 pts |
| Track 3 | IF LOCAL CODE AUTHORITY ONLY:<br>For cities located in states with no statewide codes, points are awarded based on the codes adopted by the city. | > 2015 IECC = 4 pts<br>2015 IECC = 3 pts<br>≥ 2012 IECC = 2 pts<br>< 2012 IECC and > 2009 IECC = 1 pt<br>≤ 2009 IECC or less stringent than state code = 0 pts | > 2015 IECC or ASHRAE 2013 = 4 pts<br>2015 IECC or ASHRAE 2013 = 3 pts<br>≥ 2012 IECC or ASHRAE 2010 = 1.5 pts<br>< 2012 IECC or ASHRAE 2010 or less stringent than state code = 0 pts |
| Bonus | FOR ALL CITIES:<br>All cities (that have not yet reached max points in this category) are eligible to receive credit for participating in the ICC model energy code development process. | 0.5 pts for active participation, which includes documented advocacy or a voting record | |

We gathered data on code stringency and related activities from a variety of sources, including state code stringency data from *The 2016 State Energy Efficiency Scorecard*, data requests sent to local government officials in each city, the Database of State Incentives for Renewables and Efficiency, and independent city-by-city research. Scores for each city's code stringency are included in table 27, after the section on enforcement and compliance.

### *BUILDING ENERGY CODE ENFORCEMENT AND COMPLIANCE*

State and local agencies usually implement energy codes, including plan review and field inspections. These agencies are responsible for code compliance, enforcement, and training. States that have building codes often have state agencies that support local code officials with technical and educational assistance and that oversee the enforcement practices of local agencies. Even when the code is set at the state level, authority to enforce it is typically delegated to local agencies that review plans and inspect construction. Compliance requirements vary by city agency. Most of the enforcement in local jurisdictions is centered on the permitting process. In jurisdictions without strict enforcement, engineers or architects for a building construction project must certify that their plans are code compliant. In jurisdictions with stricter enforcement, plans are submitted to code officials for review. Some jurisdictions also require onsite inspections of construction work and building performance testing upon completion. Permit fees and municipal taxes fund local government enforcement. Some additional support for building energy code enforcement comes from DOE for training and development of software tools for code officials. State energy offices may also fund training.

Noncompliance with energy codes results in lost energy savings over the life of the building (Rosenberg et al. 2016). Although recent studies show compliance rates reaching over 80%, these results may be misleading. US states and cities use different compliance evaluation methodologies, and it is often difficult to access commercial code compliance documentation and buildings for evaluation. Additionally, most compliance studies report only on new construction since data are harder to obtain for retrofit projects (Bartlett et al. 2016).

A lack of funding or resources is commonly cited as a local government's reason for not enforcing building energy codes. Enforcement of energy codes is often the first thing to be left out of building code enforcement when resources are limited. Energy codes are sometimes viewed as nonessential compared with building codes that protect people against more immediate hazards, such as fire and lack of structural soundness. Because few reports exist for city-level compliance rates, we use several proxies in the *City Scorecard* to evaluate code compliance and enforcement efforts.

A city could earn up to 6 points for building energy code enforcement and compliance:

- Staff dedicated to energy code enforcement (1 point)
- Code compliance verification strategies such as plan reviews and performance testing (2 points)
- Required training for building code officials for energy code plan review and inspection (2 points)

- Up-front support for developers and builders for energy code compliance, which may include education prior to permit issuance or application review (1 point)

The methodology used to score cities on each of these four metrics follows and is outlined in table 26.

### City Staffing for Building Energy Code Compliance

Cities with staff dedicated to energy code compliance can track code infractions and identify where the majority of code issues exist in their jurisdiction. Staff with deep knowledge of the energy codes can facilitate higher-quality plan reviews and inspections and raise code awareness and compliance (NRDC and IMT 2016a, DOE 2013). Cities receive 1 point for supporting at least one regular, full-time position whose primary duties include energy code compliance.

### Energy Code Compliance Strategies

Cities could receive up to 2 points for code compliance strategies such as mandatory programs that require plan reviews, field inspections, and third-party performance testing to verify and bolster compliance. Required performance testing is becoming more prevalent in the model energy codes. For example, the 2012 and 2015 IECCs mandate duct and building envelope testing in new residential construction.

Some cities use third parties to conduct plan reviews, in order to expedite the permit approval process or to provide specific expertise to complex projects. Third-party compliance programs can reduce the costs incurred by a city's buildings department while improving quality and timeliness (Meres 2012). The city administers these programs to keep up with training and staffing needs that result from fluctuations in construction activity. In Washington, DC, the Third Party Program approves and certifies contractors to provide plan reviews and inspections for construction projects. These professionals must have specific qualifications in one or more disciplines, of which energy is one (District of Columbia 2016c).

A city receives 1 point for having a voluntary energy code compliance program; it receives 1.5 points if the program is mandatory. We award an additional 0.5 points to the score where the city requires third-party performance testing (or commissioning) as part of its residential or commercial energy code compliance process.

### Energy Code Training Requirements for Building Code Officials

Jurisdictions educate and support code officials to verify that what is built actually complies with the energy codes. Some cities require plan reviewers and inspectors to obtain International Energy Conservation Code (IECC) certification. Cities receive points if they require training for code officials on energy code plan review and inspection. We award them 2 points for offering mandatory training that prepares code officials to enforce the energy codes.

### Up-Front Support for Building Energy Code Compliance

Cities can help the design and construction community comply with energy codes (DOE 2015). To account for these additional efforts, we allocate 1 point to cities that provide

developers, builders, or owners with up-front support on building energy code compliance, which could include education prior to application reviews and permit issuance. For state-run training opportunities, cities can receive 0.5 points for hosting and actively promoting training in their city.

Table 26 summarizes the scoring methodology for the four metrics described above.

**Table 26. Scoring for building energy code enforcement and compliance**

| Building energy code enforcement and compliance | Description | Score (6 pts) |
|---|---|---|
| City staffing for building energy code compliance | City has at least one regular, full-time staff dedicated to energy code compliance and enforcement. | 1 |
| Energy code compliance | City has a mandatory compliance program. | 1.5 |
| | City has a voluntary compliance program. | 1 |
| | If a city has a program, it requires third-party performance testing for compliance verification. | +0.5 |
| Energy code training for building code officials | City requires training | 2 |
| Up-front support for building energy code compliance | City offers up-front support | 1 |
| | City hosts state-run training | 0.5 |

Table 27 lists the scores for code stringency and compliance.

**Table 27. Scores for code stringency and compliance**

| City | Authority to set code* | Code stringency (8 pts) | Code compliance and enforcement (6 pts) | Total score (14 pts) |
|---|---|---|---|---|
| New York | Local | 8 | 6 | 14 |
| Seattle† | Comm: Local Res: State | 8 | 6 | 14 |
| Austin | Local | 8 | 5 | 13 |
| Boston | State | 8 | 5 | 13 |
| Los Angeles | Local | 8 | 4.5 | 12.5 |
| San Diego | Local | 8 | 4 | 12 |
| Denver | Local | 6.5 | 5 | 11.5 |
| Houston | Local | 6 | 5 | 11 |
| Chicago | Local | 6 | 4.5 | 10.5 |
| Fort Worth | Local | 6 | 4.5 | 10.5 |
| Pittsburgh | State | 4.5 | 5.5 | 10 |
| Tampa | State | 7 | 3 | 10 |

| City | Authority to set code* | Code stringency (8 pts) | Code compliance and enforcement (6 pts) | Total score (14 pts) |
|---|---|---|---|---|
| Phoenix | Local | 4 | 5.5 | 9.5 |
| San Francisco | Local | 8 | 1.5 | 9.5 |
| Washington | Local | 3.5 | 6 | 9.5 |
| Baltimore | Local | 6 | 3 | 9 |
| Portland | State | 6 | 3 | 9 |
| Richmond | State | 6 | 3 | 9 |
| San Jose | Local | 8 | 1 | 9 |
| Virginia Beach | State | 6 | 3 | 9 |
| Minneapolis | State | 6 | 2 | 8 |
| Riverside | Local | 8 | 0 | 8 |
| Sacramento | Local | 8 | 0 | 8 |
| Columbus | State | 5.5 | 2 | 7.5 |
| Dallas | Local | 6 | 1.5 | 7.5 |
| Las Vegas | Local | 3.5 | 4 | 7.5 |
| Nashville | Local | 3 | 4 | 7 |
| Philadelphia | State | 5 | 2 | 7 |
| San Antonio | Local | 6 | 1 | 7 |
| Cincinnati | State | 5.5 | 1 | 6.5 |
| Kansas City | Local | 3.5 | 3 | 6.5 |
| El Paso | Local | 6 | 0 | 6 |
| New Orleans | Local | 0 | 6 | 6 |
| Raleigh | State | 1.5 | 4.5 | 6 |
| Atlanta | Local | 0.5 | 5 | 5.5 |
| Cleveland | State | 5.5 | 0 | 5.5 |
| Jacksonville | State | 3 | 1.5 | 4.5 |
| Orlando | State | 3 | 1.5 | 4.5 |
| Milwaukee | State | 4 | 0 | 4 |
| Salt Lake City | State | 4 | 0 | 4 |
| Detroit | State | 3 | 0 | 3 |
| Hartford | State | 2 | 1 | 3 |
| Indianapolis | State | 0 | 3 | 3 |
| Miami | State | 3 | 0 | 3 |
| Louisville | State | 1 | 1 | 2 |
| Providence | State | 2 | 0 | 2 |
| Charlotte | State | 1.5 | 0 | 1.5 |
| Birmingham | Local | 0 | 0 | 0 |

| City | Authority to set code* | Code stringency (8 pts) | Code compliance and enforcement (6 pts) | Total score (14 pts) |
|---|---|---|---|---|
| Memphis | Local | 0 | 0 | 0 |
| Oklahoma City | State | 0 | 0 | 0 |
| St. Louis | Local | 0 | 0 | 0 |

* Authority applies to setting residential and commercial codes unless otherwise noted.
† In Seattle, authority to set residential codes rests with the state, while commercial codes can be set locally.

## *REQUIREMENTS AND INCENTIVES FOR EFFICIENT BUILDINGS*

A number of cities use incentives and/or requirements to promote efficiency in their new and existing buildings. Cities have many policy options to consider (SEE Action 2013). In this category we scored cities on (1) incentives or financing for efficient buildings or efficiency improvements, (2) policies requiring construction of efficient, above-code buildings, and (3) energy efficiency retrofitting or energy audit requirements for existing buildings. A city could earn up to 8 points from these metrics.

### Incentives and Financing for Efficient Buildings

A number of programs that offer incentives for efficient new buildings and retrofits have been established at the city level. Some cities encourage developers and builders to construct green and efficient buildings by providing nonfinancial incentives that speed up the permitting process or by allowing the construction of larger and/or higher structures. For example, with little to no financial investment, jurisdictions can provide a significant incentive to a builder by moving the building up in the permitting and plan review process, which can sometimes take up to 18 months (USGBC 2014). Density bonuses reward builders with increases in the maximum allowable development on a property that would otherwise be restricted under zoning and land use designations.

Cities can also encourage green building via financial incentives, including tax credits, permit fee reductions or waivers, grants, or property tax abatements. Financing mechanisms enabled by city policy can also encourage energy efficiency improvements in buildings. Examples include property assessed clean energy financing (PACE), tax increment financing (TIF), and revolving loan funds. These government-provided funds and incentives can make investments more attractive to the private sector by reducing cost barriers, lowering risk, and mitigating regulatory compliance costs. Such mechanisms also help support technologies, products, and practices that are new to the market or are not otherwise captured by it (EPA 2015b).

Any city-provided incentives or financing mechanisms for efficient buildings that are not run through a utility program are captured in this scoring category. A city earned up to 3 points for this metric, receiving 0.5 points for each incentive or program provided by the city and 1 point if the incentive or program applies to both commercial and residential buildings.

### Green Building Requirements

Cities have adopted a variety of above-code green building requirements. Some go into effect if public funding is used for a project. Others are in place for specific classes or sizes of buildings. Some cities include green building requirements in the stretch code requirements for new construction. We awarded points in the code stringency metrics to cities whose building codes included green building requirements that applied to the entirety of the residential or commercial building stocks. This metric recognizes additional efforts a city makes to extend more stringent, above-code requirements to specific categories of buildings.[16]

A city could earn up to 2 points for this metric. Policies applying to certain classes of both commercial and residential buildings received 2 points. Policies applying to certain classes of commercial or residential buildings (but not both) received 1 point.

### Energy Audit and Retrofit Requirements

Some cities have energy management requirements for existing buildings. For example, Austin requires all homes 10 years and older to have an energy audit performed at the time of sale, with the results disclosed to buyers or prospective buyers (Austin Energy 2016). Other cities' policies also leverage the transaction period surrounding the sale of a building, requiring energy efficiency upgrades to be performed before a home is sold. Residential energy conservation ordinances (RECOs), such as the one in San Francisco, require all homes that are sold or substantially renovated to meet certain requirements for energy and water efficiency. These policies offer a way for cities to address energy use in the existing residential building stock, a segment of buildings with traditionally low rates of energy efficiency upgrade activity. Some cities also have similar retrofit requirements for commercial buildings. In New York, Local Law 87 requires buildings over 50,000 square feet to take energy audit and retrocommissioning measures every 10 years (New York 2016). In Boston, both residential and commercial buildings are required to perform energy audits and implement efficiency improvements every five years if they are not ENERGY STAR certified or LEED Silver certified, or if they have failed to show improvement in energy use savings (Boston 2013b).

A city could earn up to 2 points for retrofit requirements and up to 1 point for energy audit requirements. We awarded full points if the retrofit or audit policy applied to both commercial and residential buildings. If the policy applied to either commercial or residential buildings, we awarded half credit.

Table 28 outlines the scoring methodology for these metrics.

[16] Green building requirements do not necessarily focus solely on energy efficiency improvements. Often these requirements address how a building affects the surrounding environment and ecosystem through some or all of the following features: site selection, water conservation, stormwater management, materials use reduction, recycling, composting, use of green building materials, indoor air quality, and reduction of the urban heat island effect (EPA 2013c).

Table 28. Scoring methodology for incentives and requirements for efficient buildings

| Incentives and requirements for efficient buildings, retrofits, or audits | Score (8 points) |
|---|---|
| The city provides incentives or financing programs for energy-efficient new construction or building improvements. | 0.5 points per incentive or program, or 1 point if program applies to both residential and commercial (3 points maximum) |
| The city has above-code green building requirements that include energy efficiency standards, for certain categories of private buildings. | 2 points if required for some private residential AND commercial buildings<br>1 point if required for some private residential OR commercial buildings |
| The city has building energy audit requirements. | 1 point if required for residential AND commercial buildings<br>0.5 points if required for residential OR commercial buildings |
| The city has building retrofit or retrocommissioning requirements. | 2 points if required for residential AND commercial buildings<br>1 point if required for residential OR commercial buildings |

Table 29 lists the scores for each city.

Table 29. Scores for requirements and incentives for efficient buildings

| City | Incentives and financing (3 pts) | Green building requirements (2 pts) | Audit requirements (1 pt) | Retrofit requirements (2 pts) | Total score (8 pts) |
|---|---|---|---|---|---|
| Los Angeles | 3 | 2 | 1 | 2 | 8 |
| Boston | 2 | 2 | 1 | 2 | 7 |
| Austin | 3 | 2 | 0.5 | 1 | 6.5 |
| San Francisco | 3 | 2 | 0.5 | 1 | 6.5 |
| New York | 2 | 0 | 1 | 2 | 5 |
| Washington | 2.5 | 2 | 0 | 0 | 4.5 |
| Baltimore | 2 | 2 | 0 | 0 | 4 |
| San Jose | 2 | 2 | 0 | 0 | 4 |
| Phoenix | 2 | 2 | 0 | 0 | 4 |
| Orlando | 1 | 0 | 1 | 2 | 4 |
| Seattle | 3 | 0 | 0 | 1 | 4 |
| Pittsburgh | 1.5 | 2 | 0 | 0 | 3.5 |
| Philadelphia | 2.5 | 1 | 0 | 0 | 3.5 |
| Portland | 1 | 2 | 0 | 0 | 3 |
| Dallas | 1 | 2 | 0 | 0 | 3 |
| Indianapolis | 3 | 0 | 0 | 0 | 3 |
| Minneapolis | 3 | 0 | 0 | 0 | 3 |

| City | Incentives and financing (3 pts) | Green building requirements (2 pts) | Audit requirements (1 pt) | Retrofit requirements (2 pts) | Total score (8 pts) |
|---|---|---|---|---|---|
| Miami | 0.5 | 2 | 0 | 0 | 2.5 |
| Denver | 2.5 | 0 | 0 | 0 | 2.5 |
| Cleveland | 1.5 | 1 | 0 | 0 | 2.5 |
| St. Louis | 2.5 | 0 | 0 | 0 | 2.5 |
| Salt Lake City | 2.5 | 0 | 0 | 0 | 2.5 |
| Milwaukee | 2.5 | 0 | 0 | 0 | 2.5 |
| Riverside | 2.5 | 0 | 0 | 0 | 2.5 |
| Houston | 2.5 | 0 | 0 | 0 | 2.5 |
| Chicago | 2 | 0 | 0 | 0 | 2 |
| Louisville | 2 | 0 | 0 | 0 | 2 |
| San Diego | 2 | 0 | 0 | 0 | 2 |
| Memphis | 2 | 0 | 0 | 0 | 2 |
| Atlanta | 1 | 0 | 0.5 | 0 | 1.5 |
| Detroit | 1.5 | 0 | 0 | 0 | 1.5 |
| Nashville | 1.5 | 0 | 0 | 0 | 1.5 |
| Cincinnati | 1.5 | 0 | 0 | 0 | 1.5 |
| Kansas City | 1.5 | 0 | 0 | 0 | 1.5 |
| Tampa | 1.5 | 0 | 0 | 0 | 1.5 |
| Richmond | 1 | 0 | 0 | 0 | 1 |
| Columbus | 1 | 0 | 0 | 0 | 1 |
| Sacramento | 1 | 0 | 0 | 0 | 1 |
| San Antonio | 1 | 0 | 0 | 0 | 1 |
| New Orleans | 0.5 | 0 | 0.5 | 0 | 1 |
| El Paso | 1 | 0 | 0 | 0 | 1 |
| Virginia Beach | 1 | 0 | 0 | 0 | 1 |
| Las Vegas | 0.5 | 0 | 0 | 0 | 0.5 |
| Oklahoma City | 0.5 | 0 | 0 | 0 | 0.5 |
| Charlotte | 0 | 0 | 0 | 0 | 0 |
| Birmingham | 0 | 0 | 0 | 0 | 0 |
| Hartford | 0 | 0 | 0 | 0 | 0 |
| Fort Worth | 0 | 0 | 0 | 0 | 0 |
| Jacksonville | 0 | 0 | 0 | 0 | 0 |
| Providence | 0 | 0 | 0 | 0 | 0 |
| Raleigh | 0 | 0 | 0 | 0 | 0 |

### *BUILDING BENCHMARKING, RATING, AND ENERGY USE TRANSPARENCY*

Building benchmarking, rating, and energy use transparency policies have gained traction at the city level in recent years. While these policies do not directly require upgrades or changes in behavior, energy consumption data are critical for quantifying and evaluating building energy use patterns in order to save energy in a city's building stock. Benchmarking and energy use transparency can increase investment in energy efficiency improvements and provide post-implementation information about their impact. In an analysis by the EPA, energy consumption decreased by 7% over three years in a pool of 35,000 benchmarked buildings (ENERGY STAR 2012).

Cities could earn a maximum of 6 points in this section. Points are awarded for mandatory benchmarking, rating, and transparency policies that apply to commercial and residential buildings. Cities with authority to pass these types of ordinances but that have not yet done so can receive 0.5 points for a benchmarking program (e.g., Kilowatt Krackdown). Cities without authority to pass benchmarking and transparency ordinances can earn points for establishing a similar policy for tracking building energy performance.

Some cities have gone a step beyond requiring benchmarking of a building's energy use by requiring buildings to undertake an energy audit or make improvements. These requirements are captured under Incentives and Requirements for Efficient Buildings, discussed earlier in this chapter.

#### Mandatory Policies

Benchmarking and energy use transparency help cities identify buildings and building types that consume a large amount of energy. This information can be used to determine opportunities for targeted energy savings programs to meet GHG emissions or energy use reduction goals. In jurisdictions with commercial benchmarking requirements, buildings benchmark their energy use using a web-based tool. The ENERGY STAR Portfolio Manager tool is the one most commonly used by cities for benchmarking. However policies differ with regard to enforcement strategies, education, support for building owners, and data disclosure rules. Some cities disclose building energy consumption data to the public on a recurring basis (e.g., annually), while others require disclosure only at the time of a transaction, such as in a purchase or lease agreement, and only to the parties involved.

Benchmarking requirements are most common to commercial buildings but sometimes include multifamily buildings. In the *City Scorecard*, we score multifamily benchmarking in the residential category. We allocate 3 points for commercial and residential building benchmarking and energy use transparency policies. We award points based on whether a city has passed a policy, its implementation status, the details of the policy, and the level of data disclosure. We base this scoring on best practices adapted from ACEEE's report on multifamily benchmarking (ACEEE 2014).

For the single-family market, energy use transparency policies can (1) show the value of energy efficiency when a home is sold, (2) encourage energy efficiency upgrades, and (3) generate information for better valuation of energy efficiency improvements for appraisals and mortgage underwriting. Current residential policies take four different forms:

- Access to utility bills at the time of sale
- Access to information on a home's energy efficiency features at the time of sale
- Energy audit requirements and access to audit report results at the time of sale
- Annual benchmarking (Cluett and Amann 2013)

The real estate industry is improving access to information on energy efficiency characteristics and/or energy use at the time a residential home or unit is listed for sale. This information is entered into the Multiple Listing Service (MLS). Residential real estate listings may include documentation of a Home Energy Rating System (HERS) score, Home Energy Score (HES), ENERGY STAR certification, LEED certification, or other green building rating.

Cities that have authority but have not passed a benchmarking ordinance can receive 0.5 points for implementing a benchmarking program. The half-point credit may also apply to cities with benchmarking ordinances that also have programs in place for buildings not affected by the ordinance (e.g., small commercial buildings). Louisville's and Orlando's Kilowatt Crackdown and Salt Lake City's Project Skyline Challenge are examples of benchmarking programs.

### Voluntary Benchmarking

Some cities do not have the authority to pass energy benchmarking ordinances but run programs that encourage private building owners to voluntarily benchmark their buildings. Cities can earn up to 2 points for such programs. We award an additional 1 point to cities that provide benchmarking training and resources to owners. To receive credit, the program must (1) have been active between 2015 and 2017, (2) target at least some portion of the city's private building stock, and (3) have methods in place to measure participation.

These scoring criteria for benchmarking and transparency policies are summarized in table 30. Cities can earn a maximum of 3 points for commercial policies and 3 points for residential policies.

Table 30. Scoring methodology for commercial and residential benchmarking and transparency policies

| Scoring when city **can** adopt benchmarking policy | Commercial (3 pts) | Residential (3 pts) |
|---|---|---|
| The city is actively running a program that encourages private buildings to benchmark energy use. | 0.5 | 0.5 |
| Benchmarking requirement has been passed. | 1 | 1 |
| Benchmarking/energy use transparency requirements are in effect. | 1.5 | 1.5 |
| City has or offers the following:<br>• *Training and guidance.* The city has a benchmarking help line, trains building owners, and/or provides worksheets for facilitating utility data disclosure.<br>• *Enforcement strategy.* Fines or other mechanisms are in place for noncompliance enforcement.<br>• *Reporting.* The city releases a report or database providing compliance data and/or analysis of building energy use data.<br>• *Public disclosure of energy use data.* Building owners are required to publicly disclose energy use.<br>• *Green MLS features.* The local MLS format includes a field for energy efficiency features, specifically, documentation of Home Energy Rating System score, Home Energy Score, LEED certification, other green ratings. Residential only. | 0.5 each (up to 1.5 max) | 0.5 each (up to 1.5 max) |

| Scoring when city **cannot** adopt benchmarking policy | Commercial (3 pts) | Residential (3 pts) |
|---|---|---|
| City has implemented a voluntary benchmarking program. | 2.0 | 2.0 |
| *Training and guidance.* City offers assistance to building owners to meet program metrics (best practices, guidance, and training resources). | 1.0 | 1.0 |
| *Green MLS features.* The local MLS format includes a field for energy efficiency features, specifically, documentation of Home Energy Rating System score, Home Energy Score, LEED certification, other green ratings. Residential only. | N/A | 0.5 (if max score not reached) |

Table 31 presents scores and details on commercial and residential building benchmarking and energy use transparency policies.

Table 31. Scores for commercial and residential benchmarking and transparency policies

| City | Benchmarking score (6 pts) | Policy details |
|---|---|---|
| Boston | 6 | Mandatory res policy (3). Mandatory comm policy (3). |
| Seattle | 6 | Mandatory res policy (3). Mandatory comm policy (3). |
| Chicago | 6 | Mandatory res policy (3). Mandatory comm policy (3). |
| New York | 6 | Mandatory res policy (3). Mandatory comm policy (3). |
| Washington | 6 | Mandatory res policy (3). Mandatory comm policy (3). |
| Philadelphia | 6 | Mandatory res policy (3). Mandatory comm policy (3). |
| Austin | 6 | Mandatory res policy (3). Mandatory comm policy (3). |
| Orlando | 5.5 | Mandatory res policy (2.5).<br>Mandatory comm policy (2.5). Other program (0.5). |
| Denver | 5.5 | Mandatory res policy (2.5).<br>Mandatory comm policy (2.5). Other program (0.5). |
| Kansas City | 5.5 | Mandatory res policy (2.5). Mandatory comm policy (3). |
| Los Angeles | 5 | Mandatory res policy (2.5). Mandatory comm policy (2.5). |
| Portland | 5 | Mandatory res policy (2). Mandatory comm policy (3). |
| St. Louis | 3.5 | Mandatory comm policy (2.5). Other program (0.5). Green MLS (0.5). |
| San Francisco | 3.5 | Mandatory comm policy (3). Green MLS (0.5). |
| Minneapolis | 3.5 | Mandatory comm policy (3). Green MLS (0.5). |
| Phoenix | 3.5 | Voluntary comm program (3).* Green MLS (0.5). |
| Atlanta | 3 | Mandatory comm policy (3). |
| Pittsburgh | 2.5 | Mandatory comm policy (2.5). |
| Cleveland | 0.5 | Other program (0.5) |
| Columbus | 0.5 | Other program (0.5) |
| Fort Worth | 0.5 | Other program (0.5) |
| Louisville | 0.5 | Other program (0.5) |
| Salt Lake City | 0.5 | Other program (0.5) |
| Raleigh | 0.5 | Green MLS (0.5) |
| Baltimore | 0.5 | Green MLS (0.5) |
| Birmingham | 0.5 | Green MLS (0.5) |
| San Diego | 0.5 | Green MLS (0.5) |
| Cincinnati | 0.5 | Green MLS (0.5) |
| El Paso | 0.5 | Green MLS (0.5) |
| Memphis | 0.5 | Green MLS (0.5) |
| Sacramento | 0.5 | Green MLS (0.5) |
| Charlotte | 0.5 | Green MLS (0.5) |
| Nashville | 0.5 | Green MLS (0.5) |
| Hartford | 0.5 | Green MLS (0.5) |

| City | Benchmarking score (6 pts) | Policy details |
|---|---|---|
| San Antonio | 0.5 | Green MLS (0.5) |
| New Orleans | 0.5 | Green MLS (0.5) |
| Dallas | 0.5 | Green MLS (0.5) |
| Indianapolis | 0.5 | Green MLS (0.5) |
| San Jose | 0.5 | Green MLS (0.5) |
| Richmond | 0.5 | Green MLS (0.5) |
| Oklahoma City | 0.5 | Green MLS (0.5) |
| Houston | 0.5 | Green MLS (0.5) |
| Las Vegas | 0.5 | Green MLS (0.5) |
| Virginia Beach | 0.5 | Green MLS (0.5) |
| Jacksonville | 0.5 | Green MLS (0.5) |
| Tampa | 0.5 | Green MLS (0.5) |
| Riverside | 0.5 | Green MLS (0.5) |
| Miami | 0.5 | Green MLS (0.5) |
| Providence | 0 | N/A |
| Milwaukee | 0 | N/A |
| Detroit | 0 | N/A |

***Program put in place by city without benchmarking authority**

### Other Leading Cities in the Top Five: Buildings Policies

**New York.** The New York City Carbon Challenge aims to reduce GHG emissions 80% by 2050 (against a 2005 baseline). The city expects that energy use reduction in all buildings, including small, midsize, and historic buildings, is essential in meeting the goal.

The city convened a Buildings Technical Working Group (TWG) comprising leaders from real estate, architecture, engineering, labor unions, academia, affordable housing, and environmental stewardship. The TWG brings industry expertise to energy efficiency policy and program development for new and existing buildings.

The 2016 New York City Energy Conservation Code (NYCECC) is based on the 2015 IECC and modified with strengthening amendments. The NYCECC went into effect on October 3, 2016. New York's Department of Buildings requires third-party inspections of construction projects for energy code compliance. The city requires energy code training for staff and provides up-front energy code support for designers and builders.

New York has two regulations specific to energy performance in existing buildings. Local Law 84 requires annual benchmarking and public disclosure for all commercial buildings larger than 50,000 square feet and for groups of smaller buildings on a single lot totaling more than 100,000 square feet. Local Law 87 requires these same buildings to undertake energy audit and retrocommissioning measures once every 10 years and report their results to the city. These laws were enacted in 2009.

In October 2016, the New York City Council voted to amend Local Law 84 to include buildings of 25,000 to 50,000 square feet. Owners of these midsize properties will begin to report energy and water use to the city in 2018. At that time, nearly 350 million square feet, or about 57% of citywide square footage, will be benchmarking and reporting their energy use.

**Seattle.** 2016 was an active year for building policies in Seattle. The city council approved an amendment to the existing benchmarking ordinance to make building energy performance data publicly available. Later that year, Seattle enacted a Building Tune-Ups policy, requiring nonresidential buildings 50,000 square feet or greater to conduct energy and water system optimization every five years. Buildings 200,000 square feet or greater will be first to comply in October 2018.

The 2015 Seattle Energy Code for commercial buildings was adopted in 2016. Code updates include high-efficiency HVAC systems and controls, reductions in lighting power allowance, mandatory air leakage testing, submetering, and renewable energy and solar readiness provisions. The Seattle Energy Code is approximately 20% more stringent than ASHRAE 90.1-2013 and 10% more stringent than the 2015 Washington State Energy Code. The state energy code, used to govern residential buildings in Seattle, is based on the 2015 IECC.

The city participates in the energy code development process and advocates for increased energy code stringency at the state level. The city provides energy code education and outreach to local stakeholders and requires city plan reviewers and field inspectors receive classroom training. Third-party firms perform whole building and systems performance testing and commissioning as required by Seattle for energy code compliance.

# Chapter 5. Energy and Water Utilities

Lead Author: Ariel Drehobl

## *INTRODUCTION*

Utilities can be valuable partners to cities in delivering energy efficiency programs. In nearly every state, customers of energy utilities fund energy efficiency programs through surcharges on their utility bills. These programs, implemented by the electric and gas utilities or through statewide independent program administrators, have a long record of delivering energy savings to residential, commercial, and industrial customers (York et al. 2012; Nowak et al. 2013). Investments in energy efficiency programs have increased steadily over the past decade, reaching $7.7 billion annually in 2015 (Berg et al. 2016).

Furthermore, utilities are well suited to design and implement programs to reach traditionally underserved markets, such as those with lower incomes or residents of multifamily buildings. Cities can assist utilities by helping with program outreach and coordination. On average, low-income families pay up to three times more than the average household on utility bills as a percentage of their income (Drehobl and Ross 2016). Energy efficiency programs can help alleviate this high burden. Both investor-owned utilities (IOUs) and municipally owned utilities (MOUs) are well suited to design programs for low-income and multifamily residents.

In cities with IOUs, state policy is usually the primary driver of energy efficiency programs. However the policies that shape these programs and the level of program investments are often subject to review, and cities can intervene in these processes to advocate for expanded programs that serve their citizens. While cities generally do not directly regulate IOUs, they can partner with them to promote their programs, help them reach their savings targets, and leverage utility resources for city-funded programs. By partnering with utilities as programs are developed, cities can help to align utility incentives with local policy goals.

In contrast, cities with municipally owned energy utilities have direct influence over the level of investment and the types of efficiency programs they offer, and many of these cities have been leaders in delivering energy savings (Kushler et al. 2015). Municipal utility efficiency programs are often tied to local policies and sustainability and/or climate plans. For example, Austin Energy—the city of Austin's municipally owned utility—has goals for energy savings, reductions in GHG emissions, and renewable energy generation that are consistent with Austin's Climate Protection Plan (Austin Energy 2014b).

Water utilities are also important influencers of energy efficiency, often implementing programs to improve both energy and water efficiency throughout the water treatment and delivery system and among their customers. Water usage involves significant energy consumption because electricity and/or natural gas are used to source, treat, and transport potable water and to collect, transport, treat, and discharge wastewater, as well as to heat hot water at the consumer end use. As a result, improving the water efficiency in municipal systems can also result in reduced energy consumption (Young 2014).

### *SCORING*

We scored cities based on the efficiency efforts of their primary electric, gas, and water utilities and the extent to which cities partner with them to enable utility-sector efficiency programs. Cities could earn up to 20 points in the utility category, with a maximum of 15 points for energy utilities and 5 points for water utilities. We scored according to the following metrics, which assess the actions of each city or its primary electric and natural gas utility:

- Electricity efficiency program energy savings (3 points)
- Natural gas efficiency program energy savings (1.5 point)
- Spending on electricity energy efficiency programs (3 points)
- Spending on natural gas energy efficiency programs (1.5 points)
- Low-income and multifamily energy efficiency programs (4 points)
- Utilities' provision of energy usage data to customers, multitenant building owners, and local governments (2 points)

We also awarded points based on the following metrics related to efficiency efforts by drinking-water and wastewater utilities:

- Combined water and energy efficiency programs (1 point)
- Citywide water savings strategies (1 point)
- Energy efficiency targets or strategies for the water system (1 point)
- Self-generation of energy by wastewater utilities (1 point)
- Green infrastructure plans for stormwater runoff and green infrastructure investment (1 point)

### *RESULTS*

Overall, results indicate that many utilities have been working to improve their energy efficiency policies. Boston remained the top-scoring city in the utility policy area for the third edition in a row. Boston continues to receive a high score for the energy utilities serving the city because of their substantial investment in electricity and natural gas efficiency programs, consistent access to and advocacy for utility data, comprehensive low-income and multifamily utility programs, and strong partnerships with the city. Seattle and San Francisco tied for second place in the utility category, both earning full credit for their low-income and multifamily efficiency programs, scoring strongly in efficiency savings and spending, and excelling in the water efficiency metrics.

Seven cities received full credit in the water efficiency section, including Austin, Boston, Columbus, Denver, Los Angeles, New York, and San Diego. These cities all show strong leadership in advancing efficiency policies at their drinking water and wastewater utilities and at the city level. For example, Denver received the maximum score for water utilities due to strong coordination between water and energy utilities on programs, as well as the development of a master plan to address both stormwater and green infrastructure projects in the city.

The median total score for efficiency efforts by energy and water utilities was 9.5 points (the same as 2015), with the lowest score, 0.5 points, given to Birmingham. Table 32 lists the scores for energy and water utilities.

**Table 32. Scores for energy and water utilities**

| City | Energy utilities (15 pts) | Water utilities (5 pts) | Total score (20 pts) |
|---|---|---|---|
| Boston | 15 | 5 | 20 |
| San Francisco | 12.5 | 4.5 | 17 |
| Seattle | 12.5 | 4.5 | 17 |
| Chicago | 12.5 | 4 | 16.5 |
| Minneapolis | 12.5 | 4 | 16.5 |
| San Jose | 12.5 | 4 | 16.5 |
| Denver | 11 | 5 | 16 |
| San Diego | 11 | 5 | 16 |
| Portland | 11.5 | 3.5 | 15 |
| Providence | 13 | 2 | 15 |
| Los Angeles | 9.5 | 5 | 14.5 |
| Sacramento | 10 | 3.5 | 13.5 |
| Columbus | 8 | 5 | 13 |
| New York | 8 | 5 | 13 |
| Baltimore | 10 | 2.5 | 12.5 |
| Austin | 7 | 5 | 12 |
| Phoenix | 8 | 4 | 12 |
| Salt Lake City | 9.5 | 2.5 | 12 |
| Washington | 8 | 4 | 12 |
| Philadelphia | 8.5 | 3 | 11.5 |
| Riverside | 7.5 | 4 | 11.5 |
| Hartford | 10 | 1 | 11 |
| Milwaukee | 8 | 3 | 11 |
| Detroit | 8.5 | 1 | 9.5 |
| Kansas City | 6.5 | 3 | 9.5 |
| Pittsburgh | 6.5 | 3 | 9.5 |
| Cleveland | 5 | 4 | 9 |
| Atlanta | 3.5 | 4.5 | 8 |
| Indianapolis | 5 | 3 | 8 |
| Charlotte | 4 | 3.5 | 7.5 |
| Fort Worth | 3 | 4 | 7 |
| Las Vegas | 3 | 4 | 7 |

| City | Energy utilities (15 pts) | Water utilities (5 pts) | Total score (20 pts) |
|---|---|---|---|
| St. Louis | 6 | 1 | 7 |
| Tampa | 4 | 3 | 7 |
| El Paso | 2.5 | 4 | 6.5 |
| Houston | 4 | 2.5 | 6.5 |
| Cincinnati | 4 | 2 | 6 |
| Raleigh | 3 | 3 | 6 |
| San Antonio | 3 | 3 | 6 |
| Jacksonville | 3 | 2.5 | 5.5 |
| Memphis | 2.5 | 3 | 5.5 |
| Dallas | 2.5 | 2.5 | 5 |
| Orlando | 3 | 2 | 5 |
| Louisville | 3 | 1.5 | 4.5 |
| Richmond | 2 | 2.5 | 4.5 |
| Virginia Beach | 2 | 2.5 | 4.5 |
| Oklahoma City | 3 | 1 | 4 |
| Nashville | 0 | 3.5 | 3.5 |
| New Orleans | 2 | 0.5 | 2.5 |
| Miami | 0.5 | 1.5 | 2 |
| Birmingham | 0.5 | 0 | 0.5 |
| **Median** | **6.5** | **3** | **9.5** |

San Diego, Detroit, Providence, and Kansas City had the greatest increases in their utility scores, compared with the 2015 edition. San Diego earned full credit for the water metrics, as well as full credit for multifamily and low-income programs. Detroit and Providence maintained their electric and gas spending and savings values and earned full credit for their low-income and multifamily programs. Kansas City improved its energy efficiency in water services and electric and gas savings scores.

The gas spending and savings metrics represent one of the areas with the greatest room for improvement. Electric utilities can also do more to achieve higher spending and savings on efficiency. Many cities can increase their scores if they form partnerships with their local electricity and natural gas utilities. In addition, just 23 cities earned more than half of the available points for the low-income and multifamily metrics, indicating that more can be done to improve and expand these programs. Similarly, only 24 cities earned more than half of the available points for the data provision metrics, which shows that many cities and utilities can do more to improve these policies as well.

### *EFFICIENCY EFFORTS OF ENERGY UTILITIES*

Table 33 lists the scores for all energy utility metrics.

**Table 33. Scores for energy utility efficiency efforts**

| City | Electric efficiency spending (3 pts) | Electric savings (3 pts) | Gas efficiency spending (1.5 pts) | Gas savings (1.5 pts) | Low-income & multifamily programs (4 pts) | Data provision (2 pts) | Total energy utility score (15 pts) |
|---|---|---|---|---|---|---|---|
| Boston | 3 | 3 | 1.5 | 1.5 | 4 | 2 | 15 |
| Providence | 2 | 3 | 1 | 1.5 | 4 | 1.5 | 13 |
| Chicago | 3 | 1.5 | 1 | 1 | 4 | 2 | 12.5 |
| Minneapolis | 2.5 | 1.5 | 1 | 1.5 | 4 | 2 | 12.5 |
| San Francisco | 2.5 | 2 | 1 | 1 | 4 | 2 | 12.5 |
| San Jose | 2.5 | 2 | 1 | 1 | 4 | 2 | 12.5 |
| Seattle | 3 | 2 | 1 | 0.5 | 4 | 2 | 12.5 |
| Portland | 3 | 2 | 0.5 | 1 | 3.5 | 1.5 | 11.5 |
| Denver | 2 | 2 | 0.5 | 0.5 | 4 | 2 | 11 |
| San Diego | 2.5 | 2 | 0.5 | 0 | 4 | 2 | 11 |
| Baltimore | 2.5 | 1.5 | 0.5 | 0 | 4 | 1.5 | 10 |
| Hartford | 2 | 2 | 1 | 0.5 | 3.5 | 1 | 10 |
| Sacramento | 2 | 2 | 0.5 | 1 | 3.5 | 1 | 10 |
| Los Angeles | 1.5 | 2 | 1 | 0.5 | 3 | 1.5 | 9.5 |
| Salt Lake City | 2.5 | 1.5 | 0.5 | 1 | 2 | 2 | 9.5 |
| Detroit | 1 | 1.5 | 0.5 | 1.5 | 4 | 0 | 8.5 |
| Philadelphia | 2 | 1 | 0.5 | 0.5 | 2.5 | 2 | 8.5 |
| Columbus | 1.5 | 1.5 | 1 | 0.5 | 2 | 1.5 | 8 |
| Milwaukee | 1 | 1 | 1 | 1.5 | 3 | 0.5 | 8 |
| New York | 1 | 1 | 0.5 | 0.5 | 3 | 2 | 8 |
| Phoenix | 1.5 | 2 | 0 | 0.5 | 3 | 1 | 8 |
| Washington | 1 | 0.5 | 1 | 0.5 | 3 | 2 | 8 |
| Riverside | 0.5 | 1 | 1 | 0.5 | 3 | 1.5 | 7.5 |
| Austin | 1 | 1 | 0 | 0 | 3 | 2 | 7 |
| Kansas City | 1.5 | 1 | 0 | 0.5 | 2 | 1.5 | 6.5 |
| Pittsburgh | 1.5 | 1 | 0 | 0 | 2.5 | 1.5 | 6.5 |
| St. Louis | 1.5 | 1.5 | 0.5 | 0 | 2 | 0.5 | 6 |
| Cleveland | 1 | 1 | 0.5 | 0 | 2 | 0.5 | 5 |
| Indianapolis | 1 | 1 | 0.5 | 0.5 | 1 | 1 | 5 |
| Charlotte | 0.5 | 1 | 0 | 0 | 2 | 0.5 | 4 |
| Cincinnati | 1.5 | 1 | 0 | 0 | 1 | 0.5 | 4 |
| Houston | 0.5 | 0 | 0 | 0 | 2 | 1.5 | 4 |

| City | Electric efficiency spending (3 pts) | Electric savings (3 pts) | Gas efficiency spending (1.5 pts) | Gas savings (1.5 pts) | Low-income & multifamily programs (4 pts) | Data provision (2 pts) | Total energy utility score (15 pts) |
|---|---|---|---|---|---|---|---|
| Tampa | 1.5 | 0 | 0.5 | 0 | 1 | 1 | 4 |
| Atlanta | 0 | 0.5 | 0 | 0 | 1 | 2 | 3.5 |
| Fort Worth | 0.5 | 0 | 0 | 0.5 | 1.5 | 0.5 | 3 |
| Jacksonville | 0 | 0.5 | 0.5 | 0 | 1 | 1 | 3 |
| Las Vegas | 0 | 0.5 | 0.5 | 0.5 | 0.5 | 1 | 3 |
| Louisville | 1 | 0.5 | 0 | 0 | 1 | 0.5 | 3 |
| Oklahoma City | 0.5 | 0.5 | 0.5 | 0.5 | 1 | 0 | 3 |
| Orlando | 0 | 0.5 | 0.5 | 0 | 1.5 | 0.5 | 3 |
| Raleigh | 0.5 | 1 | 0 | 0 | 1.5 | 0 | 3 |
| San Antonio | 1 | 0.5 | 0 | 0 | 1.5 | 0 | 3 |
| Dallas | 0.5 | 0 | 0 | 0 | 1 | 1 | 2.5 |
| El Paso | 0.5 | 0.5 | 0 | 0 | 1.5 | 0 | 2.5 |
| Memphis | 0 | 0 | 0 | 0 | 2 | 0.5 | 2.5 |
| Virginia Beach | 0 | 0 | 0 | 0 | 1.5 | 1 | 2.5 |
| New Orleans | 0.5 | 0.5 | 0 | 0 | 1 | 0 | 2 |
| Richmond | 0 | 0 | 0 | 0 | 0.5 | 1.5 | 2 |
| Birmingham | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 |
| Miami | 0.5 | 0 | 0 | 0 | 0 | 0 | 0.5 |
| Nashville | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Median** | **1** | **1** | **0.5** | **0.5** | **2** | **1** | **6.5** |

### Electricity Efficiency Program Spending

Cities' abilities to influence program investments and to require energy utilities to invest in energy efficiency depend largely on whether the utilities are municipally owned or investor owned. Of the 51 cities studied, 14 had a municipally owned electric or gas utility, or both.[17] As a result, we awarded points differently depending on the type of utility serving each city, as described in each section below.

We scored cities on the annual spending for electricity energy efficiency programs reported by the primary electric utility serving the city. Utility customers fund these programs through charges on their bills or charges included directly in utility rates. In cities where customer-funded programs are administered by independent statewide program

[17] We treat Entergy New Orleans as an MOU because it is an IOU regulated by the New Orleans City Council. Similarly, we treat Pepco and Washington Gas as MOUs because the DC city council has oversight over their utility programs in the city of Washington. In both cases, the local government can significantly influence the utility's efficiency spending, as is the case for municipal utilities.

administrators, we scored their spending attributable to the local utility.[18] Although our intention was to evaluate the average level of spending on the efficiency programs available in each city, we did calculate spending in the entire utility service territory, which typically encompasses more than just the city itself. We did this because city-level data were not always available.

The scoring methodology varied depending on whether the primary electric utility was privately (investor) owned or publicly (municipally) owned. For MOUs, the scores were based on their energy efficiency program spending as a percentage of total revenue, as shown in table 34.

Cities have less direct control over the level of spending of IOUs. Therefore, when cities were served by an IOU, we awarded two-thirds of the available points based on spending and one-third based on city-utility partnerships. Cities earned a full point if the city and utility have a formal partnership in the form of a jointly developed or administered energy-saving strategy, plan, or agreement. Minneapolis's Clean Energy Partnership—among the City of Minneapolis, Xcel Energy, and CenterPoint Energy—is a leading example of a formal partnership to advance clean energy and energy efficiency policies. Cities earned 0.5 points for a collaboration without a formal partnership. The scoring methodology for IOUs is also presented in table 34.

**Table 34. Scoring for electricity program spending**

| Spending as a percentage of annual revenue | MOUs | IOUs |
|---|---|---|
| | Score (3 pts) | Score (2 pts) |
| 4.00% or greater | 3 | 2 |
| 3.00–3.99% | 2.5 | 1.5 |
| 2.50–2.99% | 2 | |
| 2.00–2.49% | 1.5 | 1 |
| 1.50–1.99% | 1 | |
| 1.00–1.49% | 0.5 | 0.5 |
| Less than 1.00% | 0 | 0 |
| Additional metric for IOUs | | Score (1 pt) |
| City and utility have a formal partnership in the form of a jointly developed or administered energy-saving strategy, plan, or agreement. | | 1 |
| City and utility have collaborated on planning, coordinating, or implementing an energy efficiency project or program without a formal partnership. | | 0.5 |

[18] For example, Energy Trust of Oregon (ETO) administers utility customer–funded energy efficiency programs. For Portland, we scored the spending that ETO attributed to Portland General Electric, the local utility. Details on whether customer-funded programs are administered by independent statewide program administrators can be found in ACEEE's State and Local Policy Database at database.aceee.org.

Unless otherwise noted, we retrieved data on 2015 electric efficiency program spending and total revenue from utility data requests.[19] Figures include all direct spending on energy efficiency programs, which may include a combination of direct incentives and technical services to customers; program administration; planning and delivery; evaluation, measurement, and verification (EM&V); and marketing and education. We do not include spending on demand response programs. We also collected data on city and utility partnerships through the data requests that we sent to both utility and city staff, unless otherwise noted. Scores reflect spending across the utility's entire service territory in the state.

Table 35 lists scores for electricity program spending. Cities with a municipal utility are highlighted. Although they are investor owned, we score Entergy New Orleans and PEPCO as MOUs, as they are regulated by the New Orleans and DC city councils, respectively.

**Table 35. Scores for electricity efficiency program spending**

| City | Electric utility or energy efficiency program administrator | 2015 spending ($) | % of utility revenue | Score for utility spending (3 pts MOUs, 2 pts IOUs) | City and utility partnership (IOUs only, 1 pt) | Total score (3 pts) |
|---|---|---|---|---|---|---|
| Boston [d] | Eversource | 247,917,974 | 9.82% | 2 | 1 | 3 |
| Seattle | Seattle City Light | 45,313,380 | 6.15% | 3 | N/A | 3 |
| Chicago | Commonwealth Edison | 200,046,576 | 4.77% | 2 | 1 | 3 |
| Portland | Portland General Electric Co. | 75,586,380 | 4.36% | 2 | 1 | 3 |
| Baltimore [c] | Baltimore Gas and Electric | 128,145,248 | 5.15% | 2 | 0.5 | 2.5 |
| San Diego | San Diego Gas & Electric | 105,272,152 | 3.11% | 1.5 | 1 | 2.5 |
| Minneapolis | Xcel (Northern States Power) | 91,385,776 | 3.09% | 1.5 | 1 | 2.5 |
| San Francisco | Pacific Gas & Electric (PG&E) | 357,984,333 | 2.73% | 1.5 | 1 | 2.5 |
| San Jose | Pacific Gas & Electric (PG&E) | 357,984,333 | 2.73% | 1.5 | 1 | 2.5 |
| Salt Lake City [a] | Rocky Mountain Power (PacifiCorp) | 56,155,000 | 2.72% | 1.5 | 1 | 2.5 |
| Providence [a] | National Grid RI (Narragansett Electric) | 82,851,000 | 8.16% | 2 | 0 | 2 |
| Hartford [i] | Eversource (Connecticut Light & Power) | 145,547,869 | 5.44% | 2 | 0 | 2 |
| Philadelphia [a] | Exelon (PECO) | 68,652,000 | 3.15% | 1.5 | 0.5 | 2 |
| Denver [g] | Xcel (Public Service Co. of CO) | 74,705,455 | 2.73% | 1.5 | 0.5 | 2 |
| Sacramento [s] | SMUD | 36,660,884 | 2.71% | 2 | N/A | 2 |
| Cincinnati | Duke Energy Ohio | 31,349,457 | 3.24% | 1.5 | 0 | 1.5 |
| Columbus [e] | American Electric Power (Ohio Power) | 65,147,500 | 2.36% | 1 | 0.5 | 1.5 |
| Kansas City [a] | Kansas City Power & Light (KCP&L) | 19,694,000 | 2.27% | 1 | 0.5 | 1.5 |
| Pittsburgh [r] | Duquesne Light Co. | 18,229,000 | 2.20% | 1 | 0.5 | 1.5 |
| Los Angeles | LADWP | 73,239,817 | 2.13% | 1.5 | N/A | 1.5 |

[19] For a list of all city and utility staff who responded to data requests, see table B1 in Appendix B.

| City | Electric utility or energy efficiency program administrator | 2015 spending ($) | % of utility revenue | Score for utility spending (3 pts MOUs, 2 pts IOUs) | City and utility partnership (IOUs only, 1 pt) | Total score (3 pts) |
|---|---|---|---|---|---|---|
| Phoenix | Arizona Public Service (APS) | 64,343,377 | 1.96% | 1 | 0.5 | 1.5 |
| St. Louis | AmerenUE (Union Electric) | 60,000,000 | 1.87% | 1 | 0.5 | 1.5 |
| Tampa [a] | Tampa Electric Co. | 27,502,000 | 1.37% | 0.5 | 1 | 1.5 |
| San Antonio [t] | CPS Energy (City of San Antonio) | 44,057,679 | 1.90% | 1 | N/A | 1 |
| Washington [u] | PEPCO | 13,300,507 | 1.83% | 1 | N/A | 1 |
| Austin | Austin Energy | 21,786,247 | 1.80% | 1 | N/A | 1 |
| Detroit | DTE Energy | 87,100,000 | 1.69% | 1 | 0 | 1 |
| Louisville [a] | Louisville Gas & Electric | 16,218,000 | 1.51% | 1 | 0 | 1 |
| Indianapolis | Indianapolis Power & Light | 16,431,371 | 1.36% | 0.5 | 0.5 | 1 |
| Milwaukee | We Energies (Wisconsin Energy) | 36,372,294 | 1.28% | 0.5 | 0.5 | 1 |
| New York [p] | ConEdison/NYSERDA | 88,183,861 | 1.08% | 0.5 | 0.5 | 1 |
| Cleveland [a] | First Energy (Cleveland Electric Illuminating) | 7,607,000 | 0.80% | 0 | 1 | 1 |
| Raleigh | Duke Energy Carolinas | 48,746,226 | 1.41% | 0.5 | 0 | 0.5 |
| Houston [j] | CenterPoint Energy | 37,447,389 | 1.32% | 0.5 | 0 | 0.5 |
| Dallas [f] | ONCOR | 48,422,842 | 1.25% | 0.5 | 0 | 0.5 |
| Fort Worth [f] | ONCOR | 48,422,842 | 1.25% | 0.5 | 0 | 0.5 |
| Charlotte | Duke Energy Carolinas | 57,211,973 | 1.17% | 0.5 | 0 | 0.5 |
| Miami [m] | Florida Power & Light Co. | 124,170,000 | 1.16% | 0.5 | 0 | 0.5 |
| Oklahoma City [q] | Oklahoma Gas & Electric | 20,678,194 | 1.14% | 0.5 | 0 | 0.5 |
| Riverside [a] | City of Riverside Public Service | 3,277,000 | 1.08% | 0.5 | N/A | 0.5 |
| New Orleans [o] | Entergy New Orleans | 5,648,627 | 1.03% | 0.5 | N/A | 0.5 |
| El Paso [h] | El Paso Electric | 4,117,383 | 0.73% | 0 | 0.5 | 0.5 |
| Las Vegas [k] | NV Energy (Nevada Power Co.) | 22,004,108 | 0.94% | 0 | 0 | 0 |
| Atlanta [b] | Georgia Power | 52,646,946 | 0.68% | 0 | 0 | 0 |
| Jacksonville | Jacksonville Electric Authority (JEA) | 5,554,629 | 0.44% | 0 | N/A | 0 |
| Orlando | Orlando Utilities Commission | 1,436,998 | 0.25% | 0 | N/A | 0 |
| Birmingham [a] | Alabama Power | 4,604,000 | 0.09% | 0 | 0 | 0 |
| Nashville [n] | Nashville Electric Service | 731,300 | 0.06% | 0 | N/A | 0 |
| Richmond [a] | Dominion Virginia Power (Virginia Electric P&L) | 3,057,000 | 0.04% | 0 | 0 | 0 |
| Virginia Beach [a] | Dominion Virginia Power (Virginia Electric P&L) | 3,057,000 | 0.04% | 0 | 0 | 0 |
| Memphis [l] | Memphis Light, Gas & Water | 399,340 | 0.03% | 0 | N/A | 0 |

Spending and revenue data are as reported for 2015 by utility staff except where noted. [a] Spending and savings data both from EIA 2016a. [b] Spending from Georgia Power 2016. [c] Spending from BGE 2016. [d] Revenues from Eversource Energy 2016. [e] Spending from AEP 2016 and revenues from EIA 2016a. [f] Spending from Oncor 2016. [g] Revenues from EIA 2016a. [h] Revenues from El Paso Electric 2016.

[i] Revenues from Eversource Energy 2016 and spending from Connecticut Light & Power 2015. [j] Revenues from CenterPoint Energy 2016c and spending from CenterPoint Energy 2016a. [k] Revenues from EIA 2016a and spending from Nevada Power Co. 2016. [l] Includes spending from the MLGW and from the Tennessee Valley Authority's (TVA) spending in the utility's service area. [m] Revenues from EIA 2016a and spending from FPL 2015. [n] Revenues from EIA 2016a and include spending from NES and from TVA in the utility's service territory. [o] Revenues and spending from Entergy New Orleans 2016. [p] Includes spending from both Con Edison and NYSERDA. [q] Revenues and savings from OG&E 2016. [r] Revenue from EIA 2016a and spending from Duquesne Light 2015. [s] Revenues from SMUD 2016 and spending from CMUA 2016. [t] Spending from CPS Energy 2015. [u] Revenues from EIA 2016a and spending from DC Sustainable Energy Utility (DCSEU) data request.

### Natural Gas Efficiency Program Spending

Cities could also earn up to 1.5 points for spending on natural gas energy efficiency programs by the primary gas utility serving each city. We gathered data on 2015 program spending and number of customers from utility data requests, unless otherwise noted. We normalized spending on all natural gas programs by the number of residential gas customers served by each utility in 2015.[20] As with electricity program spending, the natural gas program spending per residential customer represents the entire service territory, which may be larger or smaller than the city itself. Scoring is based on the ownership of the local gas utility, as either an MOU or an IOU, as shown in table 36. For cities with an MOU, the score is based solely on spending; for those with an IOU, the score is based on spending and the existence of a formal partnership between the city and the utility. In contrast to the electric spending metric, utilities could not earn credit for collaborations that were not part of a formal partnership.

Table 36. Scoring for natural gas program spending

| | MOUs | IOUs |
|---|---|---|
| Spending per residential customer | Score (1.5 pts) | Score (1 pt) |
| $50 or greater | 1.5 | 1 |
| $25–49.99 | 1 | 0.5 |
| $5–24.99 | 0.5 | |
| Less than $5 | 0 | 0 |
| Additional metric for IOUs | | Score (0.5 pts) |
| City and utility have a formal partnership in the form of a jointly developed or administered energy-saving strategy, plan, or agreement. | | 0.5 |

[20] We use spending per residential customer for natural gas efficiency programs because reliable natural gas revenue data are sparse, and use of per capita data would unfairly penalize utilities that offer natural gas service to only a portion of a city's population.

Table 37 lists scores for each city. Cities with an MOU are highlighted. Although they are investor-owned, we score Entergy New Orleans and Washington Gas as MOUs, as they are regulated by the New Orleans and DC city councils, respectively.

**Table 37. Scores for natural gas efficiency program spending**

| City | Gas utility | 2015 spending ($) | $ per residential customer | Score for utility spending (1.5 pts for MOUs, 1 pt for IOUs) | City utility partnership (IOUs only, 0.5 pts) | Total score (1.5 pts) |
|---|---|---|---|---|---|---|
| Boston | National Grid (Boston Gas Co. & Colonial Gas Co.) | 104,899,957 | 128.62 | 1 | 0.5 | 1.5 |
| Hartford | Connecticut Natural Gas | 13,305,901 | 85.34 | 1 | 0 | 1 |
| Providence | National Grid RI (Narragansett) | 20,100,000 | 77.11 | 1 | 0 | 1 |
| Washington [b] | Washington Gas | 5,395,764 | 36.48 | 1 | N/A | 1 |
| Minneapolis | CenterPoint Energy | 25,893,618 | 33.86 | 0.5 | 0.5 | 1 |
| Milwaukee | We Energies (Wisconsin Energy) | 10,868,835 | 24.88 | 0.5 | 0.5 | 1 |
| Columbus | Nisource (Columbia Gas of Ohio) | 27,686,728 | 21.05 | 0.5 | 0.5 | 1 |
| San Francisco | Pacific Gas & Electric (PG&E) | 78,581,927 | 18.63 | 0.5 | 0.5 | 1 |
| San Jose | Pacific Gas & Electric (PG&E) | 78,581,927 | 18.63 | 0.5 | 0.5 | 1 |
| Chicago | Peoples Gas | 14,387,769 | 18.32 | 0.5 | 0.5 | 1 |
| Seattle | Puget Sound Energy | 13,094,000 | 16.36 | 0.5 | 0.5 | 1 |
| Los Angeles | Sempra (Southern California Gas) | 69,542,878 | 12.55 | 0.5 | 0.5 | 1 |
| Riverside | Sempra (Southern California Gas) | 69,542,878 | 12.55 | 0.5 | 0.5 | 1 |
| Jacksonville | TECO Peoples Gas | 12,335,245 | 37.76 | 0.5 | 0 | 0.5 |
| Orlando | TECO Peoples Gas | 12,335,245 | 37.76 | 0.5 | 0 | 0.5 |
| Tampa | TECO Peoples Gas | 12,335,245 | 37.76 | 0.5 | 0 | 0.5 |
| Portland | NW Natural | 18,553,017 | 32.46 | 0.5 | 0 | 0.5 |
| Salt Lake City [a] | Questar Gas | 24,187,461 | 24.43 | 0.5 | 0 | 0.5 |
| Philadelphia | Philadelphia Gas Works | 10,561,382 | 22.22 | 0.5 | N/A | 0.5 |
| Baltimore | Baltimore Gas & Electric | 13,484,011 | 20.40 | 0.5 | 0 | 0.5 |
| Detroit | DTE Energy (MichCon Gas) | 24,000,000 | 20.00 | 0.5 | 0 | 0.5 |
| Sacramento | Pacific Gas & Electric (PG&E) | 78,581,927 | 18.63 | 0.5 | 0 | 0.5 |
| Indianapolis | Citizens Energy Group | 3,941,025 | 16.13 | 0.5 | 0 | 0.5 |
| Oklahoma City | Oklahoma Natural Gas Co. | 11,526,722 | 15.17 | 0.5 | 0 | 0.5 |
| New York | National Grid (Brooklyn Union Gas Co./NYSERDA | 13,652,221 | 14.44 | 0.5 | 0 | 0.5 |
| San Diego | San Diego Gas & Electric | 9,507,419 | 10.89 | 0.5 | 0 | 0.5 |
| Denver | Xcel (Public Service Co. of CO) | 12,880,516 | 10.27 | 0.5 | 0 | 0.5 |
| Cleveland | Dominion East Ohio | 9,300,000 | 8.40 | 0.5 | 0 | 0.5 |
| Las Vegas | Southwest Gas | 3,929,850 | 5.79 | 0.5 | 0 | 0.5 |
| St. Louis | Laclede Gas | 1,941,998 | 3.20 | 0 | 0.5 | 0.5 |

| City | Gas utility | 2015 spending ($) | $ per residential customer | Score for utility spending (1.5 pts for MOUs, 1 pt for IOUs) | City utility partnership (IOUs only, 0.5 pts) | Total score (1.5 pts) |
|---|---|---|---|---|---|---|
| Austin | Texas Gas Service | 3,068,082 | 4.76 | 0 | 0 | 0 |
| Kansas City | Missouri Gas Energy | 1,828,415 | 4.16 | 0 | 0 | 0 |
| Phoenix | Southwest Gas | 3,306,879 | 3.34 | 0 | 0 | 0 |
| Virginia Beach | AGL Resources (VA Natural Gas) | 338,658 | 1.27 | 0 | 0 | 0 |
| Fort Worth | ATMOS Energy | 744,746 | 0.59 | 0 | 0 | 0 |
| Atlanta | Atlanta Gas Light | 0 | 0.00 | 0 | 0 | 0 |
| Birmingham | Alagasco | 0 | 0.00 | 0 | 0 | 0 |
| Charlotte | Piedmont Natural Gas | 0 | 0.00 | 0 | 0 | 0 |
| Cincinnati | Duke Energy Ohio | 0 | 0.00 | 0 | 0 | 0 |
| Dallas | ATMOS Energy | 0 | 0.00 | 0 | 0 | 0 |
| El Paso | Texas Gas Service | 0 | 0.00 | 0 | 0 | 0 |
| Houston | CenterPoint Energy | 0 | 0.00 | 0 | 0 | 0 |
| Louisville | Louisville Gas & Electric | 0 | 0.00 | 0 | 0 | 0 |
| Memphis | Memphis Light, Gas & Water | 0 | 0.00 | 0 | N/A | 0 |
| Miami | Florida City Gas | 0 | 0.00 | 0 | 0 | 0 |
| Nashville | Piedmont Natural Gas | 0 | 0.00 | 0 | 0 | 0 |
| New Orleans | Entergy New Orleans | 0 | 0.00 | 0 | N/A | 0 |
| Pittsburgh | Peoples Natural Gas | 0 | 0.00 | 0 | 0 | 0 |
| Raleigh | PSNC Energy | 0 | 0.00 | 0 | 0 | 0 |
| Richmond | Richmond Department of Public Utilities | 0 | 0.00 | 0 | N/A | 0 |
| San Antonio | CPS Energy (City of San Antonio) | 0 | 0.00 | 0 | N/A | 0 |

Spending and number of customers are as reported for 2015 by utility staff except where noted. [a] Spending and number of customers from Questar Gas 2016. [b] Number of customers from EIA 2016c and includes spending from DC Sustainable Energy Utility (DCSEU).

### Savings from Electricity Energy Efficiency Programs

We used the level of energy savings achieved by utility programs as a key metric to measure the performance of energy efficiency programs available in each city. We scored the net annual incremental electric savings, as measured from the meter, from efficiency programs as a percentage of total electricity sales for the primary electric utility serving the city.[21] Savings reflect the entire utility service territory in the state, not just the city. We allocated points as shown in table 38.

[21] Net incremental savings refer to new savings from energy efficiency programs implemented in a given year that have been adjusted to account for free-rider and spillover effects.

**Table 38. Scoring for savings from electricity efficiency programs**

| Savings as a percentage of sales | Score (3 pts) |
|---|---|
| 2% or greater | 3 |
| 1.80–1.99% | 2.5 |
| 1.40–1.79% | 2 |
| 1.00–1.39% | 1.5 |
| 0.60–0.99% | 1 |
| 0.20–0.59% | 0.5 |
| Less than 0.2% | 0 |

Table 39 includes cities' scores related to electricity savings as well as the level of savings in megawatt-hours (MWh) and as a percentage of retail sales. Unless otherwise noted, we collected data on 2015 electric efficiency program savings and total retail sales from utility data requests. We scored the utilities on net meter data.[22] In cases where utilities reported gross data, we applied a standard factor of 0.817 to convert gross savings to net savings (a net-to-gross ratio), as indicated in the footnotes of the table below.[23] Cities with an MOU are highlighted. Although they are investor-owned, we score Entergy New Orleans and PEPCO as MOUs, as they are regulated by the New Orleans and DC city councils, respectively.

**Table 39. Scores for incremental savings from electric utilities**

| City | Electric utility or energy efficiency program administrator | 2015 net incremental savings (MWh) | % of retail sales | Total score (3 pts) |
|---|---|---|---|---|
| Boston | Eversource | 730,731 | 3.15% | 3 |
| Providence [a] | National Grid RI (Narragansett Electric) | 204,408 | 2.69% | 3 |
| San Diego | San Diego Gas & Electric | 264,350 | 1.63% | 2 |
| Seattle | Seattle City Light | 146,017 | 1.60% | 2 |
| Portland | Portland General Electric Co. | 279,129 | 1.58% | 2 |
| Hartford [e] | Eversource (Connecticut Light & Power) | 334,298 | 1.51% | 2 |
| Phoenix † | Arizona Public Service (APS) | 419,737 | 1.50% | 2 |
| Los Angeles † | LADWP | 336,760 | 1.45% | 2 |

[22] Meter savings includes energy savings behind the customer meter, which does not include savings due to avoided line losses. Net savings are attributable to energy efficiency programs and may implicitly or explicitly include the effects of factors such as free ridership, participant and nonparticipant spillover, and induced market effects. ACEEE recognizes that utilities calculate and report net savings in various ways and for various purposes (or, in some cases, do not recognize the concept of net savings), so in the data request we ask for clarification and sources for the figures provided for the purpose of improving comparison across utilities.

[23] We based the 0.817 net-to-gross factor on the 2015 median net-to-gross electric savings ratio calculated from states that reported figures for both net and gross savings in *The 2016 State Energy Efficiency Scorecard* (Berg et al. 2016). These included California, Connecticut, Maryland, New Mexico, New York, North Carolina, Oklahoma, Oregon, Rhode Island, Utah, West Virginia, and Wisconsin.

| City | Electric utility or energy efficiency program administrator | 2015 net incremental savings (MWh) | % of retail sales | Total score (3 pts) |
|---|---|---|---|---|
| San Francisco | Pacific Gas & Electric (PG&E) | 1,214,273 | 1.41% | 2 |
| San Jose | Pacific Gas & Electric (PG&E) | 1,214,273 | 1.41% | 2 |
| Denver | Xcel (Public Service Co. of CO) | 405,558 | 1.41% | 2 |
| Sacramento [a] | SMUD | 146,937 | 1.40% | 2 |
| Chicago | Commonwealth Edison | 1,122,656 | 1.29% | 1.5 |
| Detroit | DTE Energy | 620,700 | 1.28% | 1.5 |
| St. Louis | AmerenUE (Union Electric) | 460,562 | 1.28% | 1.5 |
| Baltimore | Baltimore Gas and Electric | 386,505 | 1.28% | 1.5 |
| Minneapolis † | Xcel (Northern States Power) | 379,424 | 1.25% | 1.5 |
| Columbus † [c] | American Electric Power (Ohio Power) | 460,706 | 1.06% | 1.5 |
| Salt Lake City [j] | Rocky Mountain Power (PacifiCorp) | 254,000 | 1.05% | 1.5 |
| Indianapolis | Indianapolis Power & Light | 133,929 | 0.97% | 1 |
| Austin † | Austin Energy | 123,169 | 0.96% | 1 |
| Milwaukee † [j] | We Energies (Wisconsin Energy) | 207,961 | 0.88% | 1 |
| Raleigh | Duke Energy Carolinas | 322,655 | 0.86% | 1 |
| Charlotte | Duke Energy Carolinas | 473,792 | 0.82% | 1 |
| Kansas City [a] | Kansas City Power & Light (KCP&L) | 69,108 | 0.82% | 1 |
| Cleveland [a] | First Energy (Cleveland Electric Illuminating) | 146,342 | 0.79% | 1 |
| Riverside [a] | City of Riverside Public Service | 15,791 | 0.72% | 1 |
| Cincinnati † [b] | Duke Energy Ohio | 181,859 | 0.71% | 1 |
| New York [m] | ConEdison/NYSERDA | 390,201 | 0.68% | 1 |
| Philadelphia [a] | Exelon (PECO) | 251,370 | 0.66% | 1 |
| Pittsburgh [a] | Duquesne Light Co. | 87,543 | 0.65% | 1 |
| Las Vegas † [g] | NV Energy (Nevada Power Co.) | 131,029 | 0.59% | 0.5 |
| Washington [p] | PEPCO | 53,724 | 0.48% | 0.5 |
| Louisville [a] | Louisville Gas & Electric | 52,296 | 0.44% | 0.5 |
| Atlanta † | Georgia Power | 309,275 | 0.37% | 0.5 |
| San Antonio | CPS Energy (City of San Antonio) | 101,209 | 0.36% | 0.5 |
| Oklahoma City [n] | Oklahoma Gas & Electric | 83,616 | 0.35% | 0.5 |
| El Paso [d] | El Paso Electric | 22,283 | 0.29% | 0.5 |
| New Orleans [l] | Entergy New Orleans | 20,349 | 0.29% | 0.5 |
| Jacksonville | Jacksonville Electric Authority (JEA) | 33,754 | 0.28% | 0.5 |
| Orlando | Orlando Utilities Commission | 16,672 | 0.22% | 0.5 |

| City | Electric utility or energy efficiency program administrator | 2015 net incremental savings (MWh) | % of retail sales | Total score (3 pts) |
|---|---|---|---|---|
| Houston [f] | CenterPoint Energy | 155,048 | 0.18% | 0 |
| Tampa | Tampa Electric Co. | 31,880 | 0.17% | 0 |
| Dallas | ONCOR | 166,594 | 0.14% | 0 |
| Fort Worth | ONCOR | 166,594 | 0.14% | 0 |
| Richmond [o] | Dominion Virginia Power (Virginia Electric P&L) | 83,383 | 0.11% | 0 |
| Virginia Beach [a] | Dominion Virginia Power (Virginia Electric P&L) | 83,383 | 0.11% | 0 |
| Miami [† i] | Florida Power & Light Co. | 114,523 | 0.10% | 0 |
| Nashville [k] | Nashville Electric Service | 4,198 | 0.04% | 0 |
| Birmingham [a] | Alabama Power | 10,422 | 0.02% | 0 |
| Memphis [h] | Memphis Light, Gas & Water | 2,206 | 0.02% | 0 |

Savings and sales data are as reported for 2015 by utility staff except where noted. † Savings converted from gross to net using 0.817 factor. [a] Sales and savings from EIA 2016a, with savings converted from gross to net by factor of 0.817. [b] Sales and savings from Duke Energy Ohio 2016. [c] Sales from EIA 2016a and savings from AEP 2016. [d] Sales from El Paso Electric 2016. [e] Sales from EIA 2016a and savings from Connecticut Light & Power 2015. [f] Sales from CenterPoint Energy 2016a and savings from CenterPoint Energy 2016b. [g] Sales from EIA 2016a and savings from Nevada Power Co. 2016. [h] Savings include both MLGW and Tennessee Valley Authority, the statewide administrator of energy efficiency programs in Tennessee. [i] Sales from FPL 2016 and savings from FPL 2015. [j] Sales from EIA 2016a. [k] Sales from EIA 2016a and include both NES and Tennessee Valley Authority, the statewide administrator of energy efficiency programs in Tennessee. [l] Sales from Entergy New Orleans 2016 and savings from Entergy 2016. [m] Includes savings from Con Edison and NYSERDA efficiency programs. [n] Savings from OG&E 2016. [o] Sales from EIA 2016a and savings from Dominion Virginia Power 2016. [p] Sales from EIA 2016a) and savings the DC Sustainable Energy Utility (DCSEU) data request.

### Savings from Natural Gas Efficiency Programs

The number of utilities offering natural gas efficiency programs and the budgets for such programs have risen considerably in recent years (Mosenthal et al. 2014). Further, trends suggest that investments in natural gas efficiency will continue to grow as utilities strive to reach higher savings goals. We scored the net annual incremental natural gas savings from efficiency programs as a percentage of natural gas residential and commercial sales for the primary natural gas utility serving the city, allocating points as shown in table 40.

**Table 40. Scoring for savings from gas efficiency programs**

| Savings as a percentage of sales | Score (1.5 pts) |
|---|---|
| 1.20% or greater | 1.5 |
| 0.70–1.19% | 1 |
| 0.20–0.69% | 0.5 |
| Less than 0.20% | 0 |

Table 41 includes the scores related to natural gas savings, as well as the level of net incremental savings in million therms (MMtherms) and as a percentage of retail sales.

Unless otherwise noted, we retrieved data on natural gas savings from utility data requests, and we retrieved data on 2015 retail sales from the EIA-176 form for all utilities. Due to the limited availability of energy efficiency reports for gas utilities, we had difficulty collecting these data for utilities that did not respond to our data request. We adjusted gross savings to net savings using a factor of 0.864.[24] Scores reflect savings across the utility's entire service territory in the state. Cities with a municipal utility are highlighted. Although they are investor-owned, we score Entergy New Orleans and Washington Gas as MOUs, as they are regulated by the New Orleans and DC city councils, respectively.

**Table 41. Scores on incremental savings from gas utilities**

| City | Gas utility | 2015 net incremental savings (MMtherms) | % of retail sales | Total score (1.5 pts) |
|---|---|---|---|---|
| Boston | National Grid (Boston Gas Co. & Colonial Gas Co.) | 14.89 | 1.60% | 1.5 |
| Milwaukee | We Energies (Wisconsin Energy) | 17.44 | 1.56% | 1.5 |
| Providence | National Grid RI (Narragansett) | 4.20 | 1.53% | 1.5 |
| Minneapolis [a] | CenterPoint Energy | 16.00 | 1.52% | 1.5 |
| Detroit | DTE Energy (MichCon Gas) | 14.80 | 1.21% | 1.5 |
| Sacramento | Pacific Gas & Electric (PG&E) | 19.35 | 1.05% | 1 |
| San Francisco | Pacific Gas & Electric (PG&E) | 19.35 | 1.05% | 1 |
| San Jose | Pacific Gas & Electric (PG&E) | 19.35 | 1.05% | 1 |
| Portland | NW Natural | 5.92 | 1.00% | 1 |
| Chicago | Peoples Gas | 8.14 | 0.91% | 1 |
| Salt Lake City [b] | Questar Gas | 7.62 | 0.86% | 1 |
| Los Angeles | Sempra (Southern California Gas) | 18.75 | 0.69% | 0.5 |
| Riverside | Sempra (Southern California Gas) | 18.75 | 0.69% | 0.5 |
| Washington | Washington Gas | 0.94 | 0.67% | 0.5 |
| Hartford | Connecticut Natural Gas | 1.71 | 0.55% | 0.5 |
| Indianapolis | Citizens Energy Group | 1.55 | 0.55% | 0.5 |
| Denver | Xcel (Public Service Co. of CO) | 5.98 | 0.49% | 0.5 |
| Columbus | Nisource (Columbia Gas of Ohio) | 8.40 | 0.46% | 0.5 |
| Oklahoma City | Oklahoma Natural Gas Co. | 2.76 | 0.41% | 0.5 |
| Seattle | Puget Sound Energy | 3.24 | 0.41% | 0.5 |
| Las Vegas † | Southwest Gas | 1.60 | 0.37% | 0.5 |
| Fort Worth | ATMOS Energy | 6.00 | 0.36% | 0.5 |
| New York | National Grid (Brooklyn Union Gas Co.)/NYSERDA | 3.53 | 0.35% | 0.5 |
| Phoenix † | Southwest Gas | 1.21 | 0.26% | 0.5 |
| Kansas City † | Missouri Gas Energy | 2.83 | 0.25% | 0.5 |

[24] We based the 0.864 net-to-gross factor for gas savings on the median 2015 net-to-gross ratio determined from *The 2016 State Energy Efficiency Scorecard* (Berg et al. 2016).

| City | Gas utility | 2015 net incremental savings (MMtherms) | % of retail sales | Total score (1.5 pts) |
|---|---|---|---|---|
| Philadelphia | Philadelphia Gas Works | 1.05 | 0.23% | 0.5 |
| Baltimore | Baltimore Gas & Electric | 0.72 | 0.18% | 0 |
| St. Louis † | Laclede Gas | 0.70 | 0.06% | 0 |
| Austin † | Texas Gas Service | 0.15 | 0.04% | 0 |
| Virginia Beach | AGL Resources (VA Natural Gas) | 0.07 | 0.03% | 0 |
| San Diego | San Diego Gas & Electric | 0.10 | 0.03% | 0 |
| Atlanta | Atlanta Gas Light | 0.00 | 0.00% | 0 |
| Birmingham | Alagasco | 0.00 | 0.00% | 0 |
| Charlotte | Piedmont Natural Gas | 0.00 | 0.00% | 0 |
| Cincinnati | Duke Energy Ohio | 0.00 | 0.00% | 0 |
| Cleveland | Dominion East Ohio | 0.00 | 0.00% | 0 |
| Dallas | ATMOS Energy | 0.00 | 0.00% | 0 |
| El Paso | Texas Gas Service | 0.00 | 0.00% | 0 |
| Houston | CenterPoint Energy | 0.00 | 0.00% | 0 |
| Jacksonville | TECO Peoples Gas | 0.00 | 0.00% | 0 |
| Louisville | Louisville Gas & Electric | 0.00 | 0.00% | 0 |
| Memphis | Memphis Light, Gas & Water | 0.00 | 0.00% | 0 |
| Miami | Florida City Gas | 0.00 | 0.00% | 0 |
| Nashville | Piedmont Natural Gas | 0.00 | 0.00% | 0 |
| New Orleans | Entergy New Orleans | 0.00 | 0.00% | 0 |
| Orlando | TECO Peoples Gas | 0.00 | 0.00% | 0 |
| Pittsburgh | Peoples Natural Gas | 0.00 | 0.00% | 0 |
| Raleigh | PSNC Energy | 0.00 | 0.00% | 0 |
| Richmond | Richmond Department of Public Utilities | 0.00 | 0.00% | 0 |
| San Antonio | CPS Energy (City of San Antonio) | 0.00 | 0.00% | 0 |
| Tampa | TECO Peoples Gas | 0.00 | 0.00% | 0 |

Sales data all from EIA 2016c, and savings data for 2015 from utility staff except where noted. † Savings converted from gross to net using 0.864 factor. [a] Savings from CenterPoint Energy 2016b. [b] Savings from Questar Gas 2016.

### Low-Income and Multifamily Energy Efficiency Programs

Low-income and multifamily households are often underserved by utility programs. In order to address this issue, many utilities design and implement programs that specifically target these households.

Each utility determines its own definitions of multifamily buildings and low-income households. Many utilities define multifamily buildings as those containing five or more units. The definition of low-income varies among utilities, with many programs using the federal definition of 200% of the Federal Poverty Level (FPL). Multifamily and low-income

utility programs are not mutually exclusive; some multifamily programs will also target low-income households, and vice versa. Residential efficiency programs generally involve rebates or behavioral strategies, which are not always well suited for low-income or multifamily markets. Low-income programs often consist of whole home retrofits or direct install programs that are offered at no cost or low cost to households or building owners (Cluett, Amann, and Ou 2016). These programs have benefits beyond just energy savings, such as improvements in health and safety and increased comfort (Russell et al. 2015).

Multifamily buildings have opportunities for substantial energy savings. Utilities and program administrators have increased annual spending on multifamily programs by at least $190 million since 2011 nationally (Samarripas, York, and Ross 2017). Cost-effective energy efficiency upgrades can improve efficiency by 15 to 30% in multifamily buildings; on a national level, this would translate to as much as $3.4 billion in savings (McKibbin et al. 2012). Even with this potential, these buildings have been historically underserved by traditional energy efficiency programs, as most are designed to target and serve single-family homes. Multifamily energy efficiency programs can provide multiple benefits to these residents and building owners, such as reduced maintenance costs, improved appliance and equipment performance, increased property value and building durability, and enhanced tenant health, safety, and comfort (Cluett and Amann 2015).

In this section, cities could earn up to 2 points for low-income energy efficiency programs and 2 points for multifamily energy efficiency programs. In each category, utilities could earn 0.5 points for each criterion, as listed in table 42 below.

**Table 42. Scoring for low-income and multifamily energy efficiency programs**

| Low-income energy efficiency programs | Score (2 pts) |
|---|---|
| The electric utility offers a low-income energy efficiency program. | 0.5 |
| The natural gas utility offers a low-income energy efficiency program. | 0.5 |
| The electric and/or natural gas utility offers a comprehensive low-income energy efficiency program. | 0.5 |
| The electric and/or natural gas utility partners with the local government, local nonprofits, and/or community organizations to design, advertise, and/or implement its low-income program. | 0.5 |
| **Multifamily energy efficiency programs** | **Score (2 pts)** |
| The electric utility offers a multifamily energy efficiency program. | 0.5 |
| The natural gas utility offers a multifamily energy efficiency program. | 0.5 |
| The electric utility offers a comprehensive energy efficiency program for multifamily customers that focuses on whole building improvements. | 0.5 |
| The natural gas utility offers a comprehensive energy efficiency program for multifamily customers that focuses on whole building improvements. | 0.5 |

For our scoring, we award 0.5 points for comprehensive low-income programs if the electric or natural gas utility offers a portfolio of low-income programs that target different low-

income populations, or if it offers a program that provides efficiency measures that go beyond direct install measures to address the whole building envelope.

For multifamily programs, we award 0.5 points for comprehensive multifamily programs if the program includes measures such as insulation and air sealing of building envelopes, upgrades to hot water and HVAC equipment and systems, improved building controls, and lighting efficiency improvements to common areas and individual units.

Cities' scores for these metrics are displayed in tables 43 and 44. Unless otherwise noted, we retrieved data on low-income and multifamily energy efficiency programs from data requests completed by utility and city staff. Table 43 lists scores for low-income efficiency programs.

**Table 43. Scores for low-income energy efficiency programs**

| City | Low-income electric program (0.5 pts) | Low-income gas program (0.5 pts) | Comprehensive low-income program (0.5 pts) | Low-income partnerships (0.5 pts) | Total score (2 pts) |
|---|---|---|---|---|---|
| Austin [c] | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Baltimore | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Boston | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Chicago | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Cleveland [b] | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Columbus [b] | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Denver | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Detroit | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Minneapolis | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Phoenix | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Providence | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| San Diego | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| San Francisco [a] | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| San Jose [a] | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Seattle | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Charlotte [c] | 0.5 | 0 | 0.5 | 0.5 | 1.5 |
| El Paso [c] | 0.5 | 0.5 | 0 | 0.5 | 1.5 |
| Fort Worth | 0.5 | 0.5 | 0.5 | 0 | 1.5 |
| Hartford [b] | 0.5 | 0.5 | 0 | 0.5 | 1.5 |
| Kansas City [b] | 0.5 | 0.5 | 0 | 0.5 | 1.5 |
| Los Angeles | 0.5 | 0.5 | 0.5 | 0 | 1.5 |
| New York [c] | 0.5 | 0.5 | 0.5 | 0 | 1.5 |
| Philadelphia | 0.5 | 0.5 | 0 | 0.5 | 1.5 |
| Pittsburgh [b] | 0.5 | 0.5 | 0.5 | 0 | 1.5 |

| City | Low-income electric program (0.5 pts) | Low-income gas program (0.5 pts) | Comprehensive low-income program (0.5 pts) | Low-income partnerships (0.5 pts) | Total score (2 pts) |
|---|---|---|---|---|---|
| Portland | 0.5 | 0.5 | 0.5 | 0 | 1.5 |
| Sacramento [a] | 0 | 0.5 | 0.5 | 0.5 | 1.5 |
| Salt Lake City [c] | 0.5 | 0.5 | 0 | 0.5 | 1.5 |
| Virginia Beach [b] | 0.5 | 0.5 | 0 | 0.5 | 1.5 |
| Cincinnati | 0.5 | 0.5 | 0 | 0 | 1 |
| Dallas | 0.5 | 0 | 0.5 | 0 | 1 |
| Houston | 0.5 | 0.5 | 0 | 0 | 1 |
| Indianapolis | 0.5 | 0.5 | 0 | 0 | 1 |
| Jacksonville [c] | 0.5 | 0 | 0 | 0.5 | 1 |
| Louisville [a] | 0.5 | 0.5 | 0 | 0 | 1 |
| Memphis | 0.5 | 0.5 | 0 | 0 | 1 |
| Milwaukee | 0.5 | 0.5 | 0 | 0 | 1 |
| New Orleans [a] | 0.5 | 0.5 | 0 | 0 | 1 |
| Oklahoma City [b] | 0.5 | 0.5 | 0 | 0 | 1 |
| Raleigh [c] | 0.5 | 0 | 0 | 0.5 | 1 |
| Riverside [a] | 0.5 | 0.5 | 0 | 0 | 1 |
| San Antonio | 0.5 | 0.5 | 0 | 0 | 1 |
| St. Louis | 0.5 | 0.5 | 0 | 0 | 1 |
| Tampa | 0.5 | 0.5 | 0 | 0 | 1 |
| Washington | 0.5 | 0.5 | 0 | 0 | 1 |
| Atlanta [c] | 0.5 | 0 | 0 | 0 | 0.5 |
| Las Vegas [b] | 0 | 0.5 | 0 | 0 | 0.5 |
| Orlando [c] | 0.5 | 0 | 0 | 0 | 0.5 |
| Richmond [b] | 0.5 | 0 | 0 | 0 | 0.5 |
| Birmingham [a] | 0 | 0 | 0 | 0 | 0 |
| Miami [a] | 0 | 0 | 0 | 0 | 0 |
| Nashville [a] | 0 | 0 | 0 | 0 | 0 |

[a] Data on electric and gas low-income from program filings or information available online. [b] Data on electric low-income programs from program filings or information available online. [c] Data on gas low-income from program filings or information available online.

Table 44 lists scores for multifamily energy efficiency programs.

Table 44. Scores for multifamily energy efficiency programs

| City | Multifamily electric program (0.5 pts) | Multifamily gas program (0.5 pts) | Comprehensive electric program (0.5 pts) | Comprehensive gas program (0.5 pts) | Total score (2 pts) |
|---|---|---|---|---|---|
| Baltimore | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Boston | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Chicago | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Denver | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Detroit | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Hartford [b] | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Milwaukee | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Minneapolis | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Portland | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Providence | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Riverside [a] | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Sacramento [a] | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| San Diego | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| San Francisco [a] | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| San Jose [a] | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Seattle | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Washington | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Los Angeles | 0.5 | 0.5 | 0 | 0.5 | 1.5 |
| New York [c] | 0.5 | 0.5 | 0.5 | 0 | 1.5 |
| Austin [c] | 0.5 | 0 | 0.5 | 0 | 1 |
| Houston | 0.5 | 0.5 | 0 | 0 | 1 |
| Memphis | 0.5 | 0.5 | 0 | 0 | 1 |
| Orlando [c] | 0.5 | 0 | 0.5 | 0 | 1 |
| Philadelphia | 0.5 | 0 | 0.5 | 0 | 1 |
| Phoenix | 0.5 | 0 | 0.5 | 0 | 1 |
| Pittsburgh [b] | 0.5 | 0 | 0.5 | 0 | 1 |
| St. Louis | 0.5 | 0 | 0.5 | 0 | 1 |
| Atlanta [c] | 0.5 | 0 | 0 | 0 | 0.5 |
| Charlotte [c] | 0.5 | 0 | 0 | 0 | 0.5 |
| Kansas City [b] | 0.5 | 0 | 0 | 0 | 0.5 |
| Raleigh [c] | 0.5 | 0 | 0 | 0 | 0.5 |
| Salt Lake City [c] | 0 | 0.5 | 0 | 0 | 0.5 |
| San Antonio | 0.5 | 0 | 0 | 0 | 0.5 |
| Birmingham [a] | 0 | 0 | 0 | 0 | 0 |

| City | Multifamily electric program (0.5 pts) | Multifamily gas program (0.5 pts) | Comprehensive electric program (0.5 pts) | Comprehensive gas program (0.5 pts) | Total score (2 pts) |
|---|---|---|---|---|---|
| Cincinnati | 0 | 0 | 0 | 0 | 0 |
| Cleveland [b] | 0 | 0 | 0 | 0 | 0 |
| Columbus [b] | 0 | 0 | 0 | 0 | 0 |
| Dallas | 0 | 0 | 0 | 0 | 0 |
| El Paso [c] | 0 | 0 | 0 | 0 | 0 |
| Fort Worth | 0 | 0 | 0 | 0 | 0 |
| Indianapolis | 0 | 0 | 0 | 0 | 0 |
| Jacksonville [c] | 0 | 0 | 0 | 0 | 0 |
| Las Vegas [b] | 0 | 0 | 0 | 0 | 0 |
| Louisville [a] | 0 | 0 | 0 | 0 | 0 |
| Miami [a] | 0 | 0 | 0 | 0 | 0 |
| Nashville [a] | 0 | 0 | 0 | 0 | 0 |
| New Orleans [a] | 0 | 0 | 0 | 0 | 0 |
| Oklahoma City [b] | 0 | 0 | 0 | 0 | 0 |
| Richmond [b] | 0 | 0 | 0 | 0 | 0 |
| Tampa | 0 | 0 | 0 | 0 | 0 |
| Virginia Beach [b] | 0 | 0 | 0 | 0 | 0 |

[a] Data on electric and gas multifamily programs from program filings or information available online. [b] Data on electric multifamily programs from program filings or information available online. [c] Data on gas multifamily programs from program filings or information available online.

### Utilities' Provision of Energy Data to Customers

Information about energy consumption enables better energy management in homes, large buildings, and entire communities. Household, whole building, and community-wide utility data can also be used to better target efficiency programs and to carry out evaluations. Utilities are critical partners in providing customers, building owners, and local planners with energy usage data in a usable format via a delivery mechanism appropriate for the user's needs.

In this section, cities could earn up to 2 points across four metrics for the accessibility of energy usage data from their electric and gas utilities, as shown in table 45.[25]

[25] The Green Button is an effort led by the utility industry to give customers access to information about their energy consumption in an easy, downloadable format. Green Button Download My Data allows customers to download their own energy consumption data directly to their computer. Green Button Connect My Data allows utility customers to automate the secure transfer of their energy usage data to authorized third parties. With access to this information, customers can use a wide variety of software and smartphone applications to better manage their personal energy consumption. More information on the Green Button initiative is available at www.greenbuttondata.org. ENERGY STAR's automated benchmarking system allows utilities and other third parties to send electronic data on energy use and building characteristics directly to Portfolio Manager. This

**Table 45. Scoring for provision of energy data by utilities**

| Data type | Score (2 pts) |
|---|---|
| *Customer data*. Utility has implemented the Green Button Download My Data, Green Button Connect My Data, or a comparable online service to provide customers with energy consumption data in a common electronic format. | 0.5 |
| *Whole building data*. Utility provides automated benchmarking services through ENERGY STAR Portfolio Manager for multitenant commercial and/or multifamily buildings. | 0.5 |
| *Community-wide data*. Energy usage information is available at the aggregate level for community planning and evaluation purposes on a monthly or annual basis. | 0.5 |
| *Advocacy*. The city actively advocates for improvements in data provision by utilities or has established data-sharing agreements with its utilities. | 0.5 |

Table 46 lists cities' scores for these metrics. Unless otherwise noted, scores are based on utility and city staff responses to our data requests.

**Table 46. Scores for provision of energy data by utilities**

| City | Customer data (0.5 pt) | Whole building data (0.5 pt) | Community-wide data (0.5 pt) | Advocacy (0.5 pt) | Total score (2 pts) |
|---|---|---|---|---|---|
| Atlanta | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Austin | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Boston | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Chicago | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Denver | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Minneapolis | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| New York | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Philadelphia | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Salt Lake City | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| San Diego | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| San Francisco | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| San Jose | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Seattle | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Washington | 0.5 | 0.5 | 0.5 | 0.5 | 2 |
| Baltimore | 0.5 | 0.5 | 0.5 | 0 | 1.5 |

information is then automatically updated each month and is visible to the building owner. This service is available in many cities that require the benchmarking of commercial buildings. We awarded points for benchmarking requirements in Chapter 4.

| City | Customer data (0.5 pt) | Whole building data (0.5 pt) | Community-wide data (0.5 pt) | Advocacy (0.5 pt) | Total score (2 pts) |
|---|---|---|---|---|---|
| Columbus | 0.5 | 0 | 0.5 | 0.5 | 1.5 |
| Houston | 0.5 | 0 | 0.5 | 0.5 | 1.5 |
| Kansas City | 0.5 | 0 | 0.5 | 0.5 | 1.5 |
| Los Angeles | 0 | 0.5 | 0.5 | 0.5 | 1.5 |
| Pittsburgh | 0.5 | 0.5 | 0.5 | 0 | 1.5 |
| Portland | 0.5 | 0 | 0.5 | 0.5 | 1.5 |
| Providence | 0.5 | 0 | 0.5 | 0.5 | 1.5 |
| Richmond | 0.5 | 0 | 0.5 | 0.5 | 1.5 |
| Riverside | 0.5 | 0.5 | 0.5 | 0 | 1.5 |
| Dallas | 0.5 | 0 | 0.5 | 0 | 1 |
| Hartford | 0.5 | 0 | 0.5 | 0 | 1 |
| Indianapolis | 0.5 | 0 | 0.5 | 0 | 1 |
| Jacksonville | 0.5 | 0 | 0.5 | 0 | 1 |
| Las Vegas | 0.5 | 0 | 0.5 | 0 | 1 |
| Phoenix | 0 | 0 | 0.5 | 0.5 | 1 |
| Sacramento | 0.5 | 0.5 | 0 | 0 | 1 |
| Tampa | 0 | 0.5 | 0.5 | 0 | 1 |
| Virginia Beach | 0 | 0 | 0.5 | 0.5 | 1 |
| Birmingham | 0 | 0.5 | 0 | 0 | 0.5 |
| Charlotte | 0 | 0.5 | 0 | 0 | 0.5 |
| Cincinnati | 0 | 0 | 0.5 | 0 | 0.5 |
| Cleveland | 0 | 0 | 0.5 | 0 | 0.5 |
| Fort Worth | 0.5 | 0 | 0 | 0 | 0.5 |
| Louisville | 0 | 0 | 0.5 | 0 | 0.5 |
| Memphis | 0.5 | 0 | 0 | 0 | 0.5 |
| Milwaukee | 0 | 0 | 0 | 0.5 | 0.5 |
| Orlando | 0 | 0 | 0 | 0.5 | 0.5 |
| St. Louis | 0.5 | 0 | 0 | 0 | 0.5 |
| Detroit | 0 | 0 | 0 | 0 | 0 |
| El Paso | 0 | 0 | 0 | 0 | 0 |
| Miami | 0 | 0 | 0 | 0 | 0 |
| Nashville | 0 | 0 | 0 | 0 | 0 |
| New Orleans | 0 | 0 | 0 | 0 | 0 |
| Oklahoma City | 0 | 0 | 0 | 0 | 0 |
| Raleigh | 0 | 0 | 0 | 0 | 0 |
| San Antonio | 0 | 0 | 0 | 0 | 0 |

### Leading Cities with MOUs

**Austin.** Austin Energy partners with Texas Gas Service, the local investor-owned gas utility, on energy efficiency program implementation. Austin Energy also partners with many local agencies, including Austin Water, the City of Austin Neighborhood Housing Program, and several not-for-profit organizations to provide energy efficiency services to the community. The city's Climate Protection Plan reinforces these partnerships by establishing shared goals for energy reduction. Austin Energy also runs a low-income energy efficiency program with comprehensive efficiency measures in partnership with Neighborhood Housing and the Green and Healthy Homes Initiative. These partners provide structural and roofing repairs, while Austin Energy provides weatherization improvements. Austin Energy also runs a multifamily efficiency program with direct install measures. Austin Energy signed on with the city to partner on the Department of Energy's Better Buildings Energy Data Accelerator, to facilitate better access to energy usage data.

**Los Angeles.** In 2014, the Los Angeles Department of Water and Power (LADWP) adopted a new target of 15% energy savings by 2020. While California requires municipal utilities to achieve 10% of their supply through energy efficiency by 2023, LADWP moved forward with a more stringent goal. In 2013, LADWP and Southern California Gas (SoCal Gas) began offering joint electric and natural gas efficiency programs for residential and business customers. As of June 2016, the LADWP–SoCal Gas partnership incorporated 18 joint programs, including the Energy Savings Assistance Program for low-income multifamily residents. LADWP also provides building owners with automated access to aggregated data on the energy usage in their buildings and is in the process of implementing the Green Button.

### Leading Cities with IOUs

**Boston.** Through Renew Boston, the city works closely with Eversource and National Grid to promote energy efficiency. Renew Boston leverages utility incentives and city resources to encourage energy efficiency upgrades for residents and businesses, including small businesses, renters, and middle-income homeowners—households that may face more barriers to energy efficiency program participation. The city is also a leading advocate for energy efficiency at the state level as a representative on the Energy Efficiency Advisory Council, and it has supported legislation that now requires owners of large and medium-size buildings to report their annual energy and water use to the public.

**Minneapolis.** In 2014, the City of Minneapolis, Xcel Energy, and CenterPoint Energy launched the Clean Energy Partnership to advance a clean energy future. The partnership aims to help the city reach its Climate Action Plan and Energy Vision with goals for 2040. The partnership is led by a joint City/Utility Board to plan, implement, and market new approaches to delivering energy efficiency in the city. The utility programs that target low-income customers, including the Home Energy Savings Program, coordinate with the Weatherization Assistance Program to offer measures to low-income customers. The utilities also offer both a Multifamily Building Efficiency and Low-Income Multifamily Building Rebate program. The city of Minneapolis has been advocating at the state level for increased data access for years. Since 2012, the city and both partner utilities have participated in a formal Customer Energy Usage Data Work Group and have submitted comments to the public utilities commission on data access topics.

**Denver.** The Denver Energy Challenge involves coordination between the City of Denver and the electric and gas utilities. Since its inception, this program has saved 23%, on average, for participants. As of 2016, more than 10,320 residents were saving money through the Challenge. Energy Outreach Colorado is a nonprofit organization that advocates for, coordinates, and administers Colorado's low-income efficiency programs and bill assistance programs. Denver advocated for better aggregation standards, whole building data access, community energy reports, better customer disclosure forms (including Spanish-language forms), and custom reports that third parties can request of the utility. As a result of the city's advocacy, Xcel began to provide automated benchmarking services, whole building aggregated data, and community energy reports.

### *EFFICIENCY EFFORTS IN WATER SERVICES*

Regardless of climate zone, water services use a great deal of energy at a significant cost to local governments and citizens. According to the EPA's ENERGY STAR program, upgrading municipal water supply and wastewater systems to minimize leaks and improve the efficiency of pumps and motors can readily achieve 10% energy savings, resulting in collective savings of about $400 million and 5 billion kilowatt-hours (kWh) annually (EPA 2008).

The actions of drinking water and wastewater utilities play an important role in the efficiency of a city. Utilities can save energy by improving pumps and motors, as well as generate energy for use onsite through the processing of wastewater. Water utilities can also reduce energy demand by lowering water demand. This close relationship means that improvements in water efficiency result in energy savings (Young 2014). Energy utilities can also partner with water utilities to provide joint energy- and water-saving measures to customers.

In California, for example, sourcing, moving, treating, heating, collecting, and disposing of water are estimated to account for 19% of the state's electricity use and 30% of its natural gas consumption (Klein et al. 2005). More than 50% of California's water-related energy consumption is for pumping and heating for agricultural and urban end uses, while water supply and treatment account for 4% and wastewater treatment, for 0.8% (CEC 2006). Urban water use in California accounts for 70% of electricity consumed for water supply and treatment, indicating the importance of water efficiency in cities (EPA 2013b). For many local governments, the cost of the energy required throughout the water process is high, typically 30–40% of their energy budgets (EPA 2016b).

City governments often directly control their water utilities. In other cases, the utilities are independent agencies serving a region. A single city may have multiple utilities providing drinking-water supply and distribution, wastewater management and treatment, and stormwater management. Local governments can take advantage of the opportunities for water and energy efficiency by partnering with the water utilities that serve them.

In this category, we highlight how cities are tackling efficiency within their water systems. Cities could earn five points in the water services category across six metrics. We examined policies targeted at both energy efficiency and water efficiency. We awarded points regardless of whether the city had direct control over its water utilities or was served by regional utilities.

#### City-Level Water Efficiency

We allocated 2 points for water efficiency. Cities could earn 1 point if the local water utility or city partners with the local energy utility to offer joint water and energy efficiency programs to ratepayers. These are programs that target water and energy savings simultaneously, through such measures as efficient clothes washers, efficient showerheads, or faucet aerators. Alternatively, we awarded cities points if the water utility or energy utility solely administers joint water and energy efficiency programs, as was the case for Los Angeles's LADWP and Eversource MA. Cities could earn partial credit (0.5 points) if the

energy utility or city offers a water efficiency program that does not include energy-saving measures beyond water.

We also awarded 1 point to cities that had a water savings target or a long-term strategy for water savings set by the local water utility or formalized by the local government. We awarded partial credit (0.5 points) if a non-revenue water savings target was in place.[26]

### Energy Efficiency at Water Utilities

We allocated 2 points for policies that encourage energy efficiency at drinking, wastewater, and/or stormwater utilities. Cities earned 1 point if one or more drinking water or wastewater utilities serving the city has a specific energy efficiency target or comprehensive energy efficiency strategy. We awarded partial credit (0.5 points) to cities that do not have water-related energy-saving targets or energy plans but have pursued some energy efficiency initiatives at their local or regional water utilities.

Cities also earned 1 point if the wastewater utility self-generates energy through methane capture or another means, such as combined heat and power. We awarded partial credit (0.5 points) to cities that capture energy resources at their wastewater facilities but do not use them onsite.

### Stormwater and Green Infrastructure Plan

We awarded the final point in the water services category to cities with a green infrastructure plan to manage stormwater runoff and increase investment in green infrastructure. Investments in distributed stormwater systems that integrate vegetation and permeable surfaces, commonly known as green infrastructure or low-impact development, reduce energy consumption required for water treatment (CNT 2010). Examples include green roofs, tree plantings, permeable pavements, and water harvesting. Cities earned full credit if they had a plan in place that simultaneously addressed stormwater and green infrastructure development, or if they had two separate plans that addressed green infrastructure and stormwater runoff independently. Cities could earn partial credit (0.5 points) if they have pursued some green infrastructure projects but did not have a comprehensive green infrastructure plan.

Table 47 shows the scoring for energy efficiency in water services.

[26] Non-revenue water is water that is treated and then lost in the system before it reaches customers. Losses can be physical losses due to actual water lost (e.g., leaks) or apparent losses (e.g. theft or metering issues). Non-revenue water-saving targets aim to reduce water loss in the system.

Table 47. Scoring for energy efficiency in water services

| Efficiency efforts in water services | Score (5 pts) |
|---|---|
| Joint water-energy programs | 1 point if the water utility or city partners with the energy utility to offer joint water and energy efficiency programs<br>0.5 points if the energy utility or city offers a water efficiency program not including energy-saving measures |
| Water savings strategy | 1 point if the city has a formalized water saving target or local water utility has a long-term strategy for water savings<br>0.5 points if the city has a non-revenue water-saving target |
| Water utility energy efficiency programs | 1 point if one or more drinking water or wastewater utilities serving the city has a specific energy efficiency target or comprehensive energy efficiency strategy<br>0.5 points if the city has no specific targets but has pursued some energy efficiency initiatives at its local or regional water utilities |
| Water utility self-generation | 1 point if the wastewater utility self generates energy through methane capture or other means such as CHP<br>0.5 points if the utility captures energy resources at wastewater facilities but does not use them on site |
| Green infrastructure and stormwater plan | 1 point if the city has a plan in place that simultaneously addresses stormwater and green infrastructure development, or if it has two separate plans that addresses them independently<br>0.5 points if the city has pursued some green infrastructure projects but does not have a comprehensive green infrastructure plan |

Table 48 lists scores for water utility efficiency efforts.

Table 48. Scores for water utilities' efficiency efforts

| City | Joint water-energy programs (1 pt) | Water savings strategy (1 pt) | Energy efficiency strategy (1 pt) | Self-generation (1 pt) | Stormwater and green infrastructure plan (1 pt) | Total score (5 pts) |
|---|---|---|---|---|---|---|
| Austin | 1 | 1 | 1 | 1 | 1 | 5 |
| Boston | 1 | 1 | 1 | 1 | 1 | 5 |
| Columbus | 1 | 1 | 1 | 1 | 1 | 5 |
| Denver | 1 | 1 | 1 | 1 | 1 | 5 |
| Los Angeles | 1 | 1 | 1 | 1 | 1 | 5 |
| New York City | 1 | 1 | 1 | 1 | 1 | 5 |
| San Diego | 1 | 1 | 1 | 1 | 1 | 5 |
| Atlanta | 0.5 | 1 | 1 | 1 | 1 | 4.5 |
| San Francisco | 0.5 | 1 | 1 | 1 | 1 | 4.5 |
| Seattle | 1 | 1 | 0.5 | 1 | 1 | 4.5 |
| Chicago | 0.5 | 1 | 0.5 | 1 | 1 | 4 |
| Cleveland | 0 | 1 | 1 | 1 | 1 | 4 |

| City | Joint water-energy programs (1 pt) | Water savings strategy (1 pt) | Energy efficiency strategy (1 pt) | Self-generation (1 pt) | Stormwater and green infrastructure plan (1 pt) | Total score (5 pts) |
|---|---|---|---|---|---|---|
| El Paso | 0 | 1 | 1 | 1 | 1 | 4 |
| Fort Worth | 0.5 | 1 | 1 | 1 | 0.5 | 4 |
| Las Vegas | 1 | 1 | 0.5 | 1 | 0.5 | 4 |
| Minneapolis | 1 | 0.5 | 1 | 1 | 0.5 | 4 |
| Phoenix | 0.5 | 1 | 1 | 1 | 0.5 | 4 |
| Riverside | 1 | 1 | 0 | 1 | 1 | 4 |
| San Jose | 0.5 | 1 | 0.5 | 1 | 1 | 4 |
| Washington | 0.5 | 1 | 0.5 | 1 | 1 | 4 |
| Charlotte | 0.5 | 1 | 1 | 0 | 1 | 3.5 |
| Nashville | 0 | 0.5 | 1 | 1 | 1 | 3.5 |
| Portland | 0.5 | 0 | 1 | 1 | 1 | 3.5 |
| Sacramento | 1 | 1 | 0 | 1 | 0.5 | 3.5 |
| Indianapolis | 1 | 0 | 1 | 0 | 1 | 3 |
| Kansas City | 0 | 0.5 | 1 | 0.5 | 1 | 3 |
| Memphis | 0.5 | 0 | 1 | 1 | 0.5 | 3 |
| Milwaukee | 0.5 | 0 | 1 | 0.5 | 1 | 3 |
| Philadelphia | 0.5 | 0 | 0.5 | 1 | 1 | 3 |
| Pittsburgh | 0 | 0 | 1 | 1 | 1 | 3 |
| Raleigh | 0.5 | 1 | 1 | 0 | 0.5 | 3 |
| San Antonio | 0.5 | 1 | 0.5 | 0.5 | 0.5 | 3 |
| Tampa | 0.5 | 0 | 1 | 1 | 0.5 | 3 |
| Baltimore | 0.5 | 0 | 0 | 1 | 1 | 2.5 |
| Dallas | 0.5 | 1 | 0 | 1 | 0 | 2.5 |
| Houston | 0.5 | 1 | 0 | 0 | 1 | 2.5 |
| Jacksonville | 1 | 0 | 0 | 1 | 0.5 | 2.5 |
| Richmond | 0.5 | 0 | 1 | 0 | 1 | 2.5 |
| Salt Lake City | 0.5 | 1 | 0 | 1 | 0 | 2.5 |
| Cincinnati | 0 | 0 | 0.5 | 1 | 0.5 | 2 |
| Orlando | 1 | 0 | 1 | 0 | 0 | 2 |
| Providence | 0.5 | 1 | 0 | 0 | 0.5 | 2 |
| Virginia Beach | 0.5 | 0 | 0 | 1 | 0.5 | 2 |
| Louisville | 0 | 0 | 1 | 0 | 0.5 | 1.5 |
| Miami | 0.5 | 1 | 0 | 0 | 0 | 1.5 |
| Detroit | 0 | 0 | 0 | 0 | 1 | 1 |
| Hartford | 0.5 | 0 | 0 | 0 | 0.5 | 1 |

| City | Joint water-energy programs (1 pt) | Water savings strategy (1 pt) | Energy efficiency strategy (1 pt) | Self-generation (1 pt) | Stormwater and green infrastructure plan (1 pt) | Total score (5 pts) |
|---|---|---|---|---|---|---|
| Oklahoma City | 0.5 | 0 | 0 | 0 | 0.5 | 1 |
| St. Louis | 0 | 0 | 0 | 0 | 1 | 1 |
| New Orleans | 0 | 0 | 0 | 0 | 0.5 | 0.5 |
| Birmingham | 0 | 0 | 0 | 0 | 0 | 0 |

### Cities with Leading Water Utilities

**New York.** In 2014, the New York Department of Environmental Protection (DEP) released its Water Demand Management Plan, a citywide program targeting a 5% overall reduction in water consumption by 2021. The plan consists of multiple strategies and more than 21 initiatives to achieve a target reduction of approximately 50 million gallons per day. To achieve this goal, the NYC DEP completed energy audits in all 14 in-city wastewater treatment plants, resulting in more than 130 recommended energy conservation measures. In addition, the energy utilities offer water efficiency programs as a way to reduce both water and energy use. The DEP 2015 Green Infrastructure Annual Report states that NYC has committed a total of $1.5 billion to installing green infrastructure through 2030. The goal of this program is to reduce combined sewer overflows by managing stormwater generation in the city.

**Columbus.** The city of Columbus has set a target for water efficiency that aims to reduce the amount of treated water produced by 3% by 2020 (to 42,284 gallons per capita). To meet the city's energy reduction goal of 20% by 2020, the Division of Water and Division of Wastewater in the Department of Public Utilities have reduced electricity usage at treatment plants by 5% and natural gas by 50%, leading to an 18.8% overall energy reduction. The energy utilities—Columbia Gas of Ohio and American Electric Power (AEP)—also offer water efficiency measures in their energy efficiency programs, such as efficient spray nozzles for restaurants and high-efficiency showerheads for low-income households. In addition, Columbus's GreenStop program encourages residents and businesses to adopt conservation measures, including those that will improve energy and water efficiency. The city recently approved the Columbus Blueprint: Clean Streams, Strong Neighborhoods plan, which aims to install green infrastructure that will remove 20% of the total suspended solids entering surface waters from stormwater runoff.

# Chapter 6. Transportation Policies

Lead Authors: Shruti Vaidyanathan and Tyler Bailey

## *INTRODUCTION*

A comprehensive approach to transportation energy efficiency at the federal, state, or local level must address the efficiency of both individual vehicles and the transportation system as a whole, including its interrelationship with land use policies. Transportation energy use accounts for approximately 28% of overall energy use in the United States (Davis, Diegel, and Boundy 2014). Similarly, transportation accounts for 25–38% of energy use in most cities in industrialized countries (López Moreno et al. 2008). For the 17 cities for which we were able to gather detailed energy consumption data (see Chapter 7), transportation accounted for an average of 36% of energy use.

While the federal government and states have made some progress in recent years toward higher fuel efficiency, local governments and metropolitan regions play a critical role in maximizing this sector's energy efficiency potential. Municipalities, for instance, must take the lead in shaping land use because they have jurisdiction over zoning laws and regulations. Likewise, central cities and other job centers influence regional commuting behavior and choices, which are major factors in transportation energy use.

Transportation efficiency policies at the local level must respond to the changing landscape of transportation energy use. Americans have seen volatile gasoline prices over many years, leading many cities to look toward efficient and advanced-technology vehicles as buffers against high costs during peak price periods. Cities can provide tax incentives for the purchase of efficient vehicles and invest in appropriate charging infrastructure for the new wave of plug-in hybrid and battery electric vehicles. These actions make buying an advanced-technology vehicle much more feasible for their residents.

Likewise, cities can influence and respond to changes in the average American's travel behavior. More and more people are choosing to take public transit, bike, and walk (DeGood 2012; Alliance for Biking and Walking 2014). To accommodate the growing demand for alternatives to driving, local governments must take the lead in giving residents transportation choices and creating communities that support safe, automobile-independent ways of getting around. The embrace of information and communications technologies (ICT) can also play an important role in spurring transportation efficiency, through such opportunities as driver assist applications and car and bike sharing (Vaidyanathan 2014).

## *SCORING*

We allocated 30 points to transportation policies that address vehicle fuel efficiency and transportation system efficiency. We scored cities across seven categories of transportation metrics with significant energy savings potential:

- Sustainable transportation plans and vehicle miles traveled (VMT) reduction targets (4 points)
- Location efficiency policies (6 points)
- Mode shift strategies (6 points)
- Public transit policies (5 points)

- Efficient vehicle policies (3 points)
- Freight transportation policies (3 points)
- Policies to preserve and create affordable housing in transit oriented developments (TOD) (3 points)

Metrics selected for this chapter are, in most cases, policies that city decision makers can influence in the short run. While it is important to note that city-level policies are most effective when they interact with or build upon the policies of encompassing jurisdictions, most of the metrics in this chapter focus on local government action. State policies and programs can foster local progress by promoting compact communities or funding the expansion of state and regional transit systems. Regional policies and agencies such as metropolitan planning organizations (MPOs) are important to the transportation planning and implementation process, bringing to the table both funding and analytical expertise.

### *RESULTS*

In general, while a number of cities are making great strides on transportation efficiency, they could all do more to take advantage of their efficiency potential. Portland, New York, Boston, and Seattle topped the transportation scores. These four cities are dedicated to reducing transportation energy use through a number of mechanisms. Chicago followed closely behind, in fifth place. Nevertheless, there is room for improvement for all cities, with the top two earning 24.5 and 24 points of the 30 available points. The median total score for the transportation sector was 10.5 points (down 1 point from 2015).

Table 49 lists the transportation scores for 2017 by policy category. For scoring details on individual metrics within these categories, see the tables in the appropriate sections below.

**Table 49. Scores for transportation**

| City | Sustainable transportation (4 pts) | Location efficiency (6 pts) | Mode shift (6 pts) | Transit (5 pts) | Efficient vehicles (3 pts) | Freight (3 pts) | Affordable TOD housing (3 pts) | Total score (30 pts) |
|---|---|---|---|---|---|---|---|---|
| Portland | 4 | 5.5 | 4.5 | 3.5 | 2 | 2 | 3 | 24.5 |
| New York | 2 | 4.5 | 4.5 | 5 | 2 | 3 | 3 | 24 |
| Boston | 4 | 3.5 | 4.5 | 5 | 2 | 0 | 2 | 21 |
| Seattle | 4 | 3.5 | 4.5 | 3.5 | 2 | 2 | 1.5 | 21 |
| Chicago | 3 | 3 | 5 | 3.5 | 3 | 1 | 2 | 20.5 |
| Washington | 3 | 3.5 | 5.5 | 4 | 2 | 0 | 1 | 19 |
| Denver | 2 | 3.5 | 5.5 | 4 | 2 | 0 | 1 | 18 |
| Los Angeles | 4 | 3 | 2 | 3 | 2 | 1 | 3 | 18 |
| San Francisco | 4 | 3 | 5 | 4 | 1 | 0 | 1 | 18 |
| Austin | 3 | 3.5 | 5 | 2 | 2 | 1 | 1 | 17.5 |
| Atlanta | 3 | 3 | 4.5 | 2.5 | 2 | 0 | 2 | 17 |
| Minneapolis | 2 | 4.5 | 3.5 | 3 | 1 | 1 | 1.5 | 16.5 |
| Philadelphia | 3 | 2.5 | 4 | 3.5 | 0.5 | 1 | 1 | 15.5 |
| San Antonio | 3 | 3 | 5 | 1.5 | 1 | 0 | 0 | 13.5 |
| Phoenix | 1 | 3.5 | 4.5 | 1 | 1 | 0 | 2 | 13 |

| City | Sustainable transportation (4 pts) | Location efficiency (6 pts) | Mode shift (6 pts) | Transit (5 pts) | Efficient vehicles (3 pts) | Freight (3 pts) | Affordable TOD housing (3 pts) | Total score (30 pts) |
|---|---|---|---|---|---|---|---|---|
| Salt Lake City | 3 | 1.5 | 4 | 4 | 0.5 | 0 | 0 | 13 |
| San Diego | 3 | 2 | 4 | 2 | 1 | 0 | 1 | 13 |
| Jacksonville | 4 | 2 | 2.5 | 1.5 | 1.5 | 1 | 0 | 12.5 |
| Baltimore | 0 | 4 | 3.5 | 3.5 | 1 | 0 | 0 | 12 |
| Kansas City | 3 | 3.5 | 3.5 | 1 | 1 | 0 | 0 | 12 |
| Louisville | 4 | 1 | 3.5 | 1.5 | 0 | 1 | 1 | 12 |
| San Jose | 1 | 2.5 | 4 | 3 | 1 | 0 | 0 | 11.5 |
| Houston | 0 | 2.5 | 3.5 | 2 | 1 | 0.5 | 1.5 | 11 |
| Nashville | 0 | 4 | 4 | 1 | 1 | 0 | 1 | 11 |
| Cleveland | 3 | 2 | 3 | 2.5 | 0 | 0 | 0 | 10.5 |
| Orlando | 3 | 3 | 2 | 1.5 | 1 | 0 | 0 | 10.5 |
| Milwaukee | 1 | 3 | 3 | 2.5 | 0.5 | 0 | 0 | 10 |
| Pittsburgh | 3 | 1 | 2 | 3 | 0.5 | 0 | 0.5 | 10 |
| Richmond | 1 | 2.5 | 3.5 | 1.5 | 0.5 | 1 | 0 | 10 |
| Dallas | 1 | 1.5 | 2 | 2 | 1 | 0 | 2 | 9.5 |
| Raleigh | 0 | 3 | 3 | 1 | 1 | 0 | 1.5 | 9.5 |
| Riverside | 3 | 2.5 | 1 | 0.5 | 1.5 | 1 | 0 | 9.5 |
| Indianapolis | 0 | 2.5 | 4 | 1 | 0.5 | 0 | 1 | 9 |
| Las Vegas | 2 | 2 | 2 | 2 | 1 | 0 | 0 | 9 |
| New Orleans | 2 | 2 | 3 | 2 | 0 | 0 | 0 | 9 |
| St. Louis | 1 | 1.5 | 3 | 2.5 | 0 | 1 | 0 | 9 |
| Columbus | 0 | 3 | 3 | 1.5 | 0.5 | 0.5 | 0 | 8.5 |
| Miami | 0 | 2 | 2.5 | 2 | 0.5 | 1 | 0 | 8 |
| Tampa | 1 | 1 | 3 | 1 | 1 | 0 | 1 | 8 |
| Charlotte | 2 | 1 | 1 | 1.5 | 1 | 0 | 1 | 7.5 |
| Cincinnati | 0 | 3.5 | 2 | 1.5 | 0.5 | 0 | 0 | 7.5 |
| Memphis | 0 | 2.5 | 3 | 1.5 | 0 | 0.5 | 0 | 7.5 |
| Providence | 1 | 2.5 | 2 | 2 | 0 | 0 | 0 | 7.5 |
| Sacramento | 2 | 1.5 | 1.5 | 1.5 | 1 | 0 | 0 | 7.5 |
| Fort Worth | 0 | 3.5 | 2.5 | 0 | 0 | 0 | 1 | 7 |
| El Paso | 1 | 2.5 | 1 | 1.5 | 0.5 | 0 | 0 | 6.5 |
| Virginia Beach | 1 | 2.5 | 1.5 | 1 | 0.5 | 0 | 0 | 6.5 |
| Birmingham | 0 | 1.5 | 3 | 0.5 | 0 | 0 | 0 | 5 |
| Hartford | 0 | 1.5 | 1 | 2 | 0 | 0 | 0 | 4.5 |
| Detroit | 0 | 0 | 1.5 | 1 | 0.5 | 0 | 0 | 3 |
| Oklahoma City | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| **Median** | **2** | **2.5** | **3** | **2** | **1** | **0** | **0** | **10.5** |

New York, Los Angeles, Austin, and Portland improved their scores by the largest margins. The bulk of Los Angeles's and Portland's improvement came from their perfect scores in sustainable transportation plans and high scores in affordable housing in transit-oriented

developments, the latter of which was a new metric in the *2017 Scorecard*. Austin improved across all categories but did especially well because of its strategies to reduce VMT, which are part of its Comprehensive Plan and Imagine Austin Plan. These plans laid out strategies to develop an integrated, expanded, and affordable transportation system that supports multiple modes of transportation. New York and Los Angeles improved their scores by the largest amount, 6.5 points. New York's perfect scores in the transit, sustainable freight, and affordable housing in TODs categories contributed to its improvement.

Cities performed especially well in the sustainable transportation and mode shift categories. This performance shows that many cities recognize the need for more efficient transportation options. For example, Los Angeles earned the full 4 points for its Sustainable City pLAn, which has a goal to reduce citywide VMT per capita by at least 5% from 2012 levels by 2025 and 10% by 2035. In mode shift, many cities earned high marks for having established targets for multimodal transportation as well as adopting a complete streets policy and a bike- and car-sharing program. Both Washington, DC, and Denver earned 5.5 out of 6 points for mode shift.

Although the median score in the freight category was low, cities are showing promise. For example, New York, Portland, and Orlando all have robust freight plans in place that outline strategies such as last-mile solutions, off-hour deliveries, or street design initiatives to improve the efficiency of their freight systems. Scores for location efficiency were also low. Portland earned 5.5 out of 6 points in this category and was the only city to earn more than 4.5 points.

Our analysis suggests that cities across the United States must make more of an effort to reduce their transportation-related energy consumption, particularly by emphasizing policies that target the efficiency of the transportation system as a whole in addition to the efficiency of vehicles.

### *SUSTAINABLE TRANSPORTATION PLANS AND TARGETS*

Sustainable transportation plans can encourage the creation of clean and efficient transportation systems in cities. They often outline multiple strategies including improved transit, location efficiency, or multimodal options in order to reduce VMTs and GHG emissions. Some plans go a step further to include specific VMT or greenhouse reduction targets, with details on how each of the proposed strategies will help achieve that target. Plans with codified targets are best practice because these targets give cities specific benchmarks against which to measure progress and gauge success.

Cities with a sustainable transportation plan earned 2 points. Cities without a stand-alone sustainable transportation plan, but with strategies included within a broader plan, such as a climate action plan, earned 1 point. We awarded an additional 2 points to cities with codified reduction targets. We awarded only 1 point if the city had targets in place that were not codified. Table 50 lists the cities that received points for this metric. Table C6 in Appendix C includes an explanation of each of these targets.

Table 50. Scores for sustainable transportation plan

| City | Sustainable transportation plan (2 pts) | Codified VMT/GHG targets (2 pts) | Total score (4 pts) |
|---|---|---|---|
| Boston | 2 | 2 | 4 |
| Jacksonville | 2 | 2 | 4 |
| Los Angeles | 2 | 2 | 4 |
| Louisville | 2 | 2 | 4 |
| Portland | 2 | 2 | 4 |
| San Francisco | 2 | 2 | 4 |
| Seattle | 2 | 2 | 4 |
| Atlanta | 1 | 2 | 3 |
| Austin | 2 | 1 | 3 |
| Chicago | 2 | 1 | 3 |
| Cleveland | 1 | 2 | 3 |
| Kansas City | 1 | 2 | 3 |
| Orlando | 2 | 1 | 3 |
| Philadelphia | 1 | 2 | 3 |
| Pittsburgh | 1 | 2 | 3 |
| Riverside | 1 | 2 | 3 |
| Salt Lake City | 1 | 2 | 3 |
| San Antonio | 1 | 2 | 3 |
| San Diego | 1 | 2 | 3 |
| Washington | 2 | 1 | 3 |
| Charlotte | 2 | 0 | 2 |
| Denver | 2 | 0 | 2 |
| Las Vegas | 2 | 0 | 2 |
| Minneapolis | 2 | 0 | 2 |
| New Orleans | 2 | 0 | 2 |
| New York | 2 | 0 | 2 |
| Sacramento | 2 | 0 | 2 |
| Dallas | 1 | 0 | 1 |
| El Paso | 1 | 0 | 1 |
| Milwaukee | 1 | 0 | 1 |
| Phoenix | 1 | 0 | 1 |
| Providence | 1 | 0 | 1 |
| Richmond | 1 | 0 | 1 |
| San Jose | 1 | 0 | 1 |
| St. Louis | 1 | 0 | 1 |
| Tampa | 1 | 0 | 1 |
| Virginia Beach | 1 | 0 | 1 |
| Baltimore | 0 | 0 | 0 |
| Birmingham | 0 | 0 | 0 |

| City | Sustainable transportation plan (2 pts) | Codified VMT/GHG targets (2 pts) | Total score (4 pts) |
|---|---|---|---|
| Cincinnati | 0 | 0 | 0 |
| Columbus | 0 | 0 | 0 |
| Detroit | 0 | 0 | 0 |
| Fort Worth | 0 | 0 | 0 |
| Hartford | 0 | 0 | 0 |
| Houston | 0 | 0 | 0 |
| Indianapolis | 0 | 0 | 0 |
| Memphis | 0 | 0 | 0 |
| Miami | 0 | 0 | 0 |
| Nashville | 0 | 0 | 0 |
| Oklahoma City | 0 | 0 | 0 |
| Raleigh | 0 | 0 | 0 |

### *LOCATION EFFICIENCY*

Where we choose to live and develop our neighborhoods has a huge impact on overall energy use. Households can reduce their transportation-related energy use by locating in compact, mixed-use communities that are well connected and near transit facilities (EPA 2011c). Policies that encourage location efficiency reduce the need to drive in the long run (Vaidyanathan and Mackres 2012). Location efficiency strategies are largely a local government responsibility and are, therefore, highly indicative of a government's leadership in transportation policies generally.

In this category we scored cities on

- The presence of location-efficient zoning codes (2 points)
- The removal or reduction of minimum parking requirements (2 points)
- Incentives to encourage the creation of mixed-use, compact communities (2 points)

#### Zoning and Parking Policies for Location-Efficient Development

Well-crafted zoning codes promote the creation of walkable, mixed-use communities. Post–World War II zoning practices have traditionally segregated industrial and residential uses of land, and some codes further divide land used for commercial, institutional, and recreational purposes. In combination with highway-focused transportation investment, this has worked against the creation of walkable, mixed-use communities that moderate overall VMT and energy use. Location-efficient communities, however, reduce the need to drive altogether as households are often positioned near public transit, employment centers, schools, and other amenities (Jonathan Rose Companies 2011).

Changes to municipal zoning regulations can direct investment and development toward high-density, mixed-use construction near existing transit facilities. Form-based zoning codes are particularly useful for the planning of these communities, as they allow for easier creation of mixed-use developments (FBCI 2016). Form-based codes focus on the

relationships between building facades and the public, the forms and masses of buildings in relation to one another, and the scale and types of streets and blocks. Additionally, form-based zoning recognizes that walkability and architectural design help create attractive communities and location-efficient development projects (Reconnecting America 2010).

Other approaches to zoning for location-efficient communities include the use of overlays that add transit-related and density requirements to existing codes. These code modifications are useful in areas that already have a certain amount of development and are located near existing transit infrastructure. Incentive-based zoning is another option, an approach that incorporates incentives for developers such as density bonuses to encourage high-density, mixed-use development around transit nodes (MITOD 2017).

Zoning regulations that support location efficiency should:

- Require mixed-use zones
- Recalibrate zoning standards to allow for compact development
- Increase building density in city centers and around transit nodes
- Modernize street standards or enact new standards to foster walkable communities
- Minimize the number of parking spaces required for new developments
- Designate preferred growth areas (Nelson 2009)

A city earned a maximum of 4 points for location-efficient zoning policies. We awarded 2 points to cities with location-efficient zoning codes that applied to the whole city, or 1 point if the code applied only to certain areas or neighborhoods. To receive credit, codes must be designed to increase density, require mixed zones, or allow for compact, walkable communities.

We awarded another 2 points to cities with sound residential parking policies. Conventional zoning codes often have minimum parking requirements that call for one or more onsite parking spaces per housing unit for all occupied units, and a certain number of spaces for commercial and institutional buildings. Such parking requirements claim significant surface area and drive up development costs, which prevent denser, more-compact development from flourishing. New research also suggests a causal link between per capita parking spaces and automobile use in cities (McCahill et al. 2015). To enable the growth of compact developments, developers need to facilitate access by non-auto modes and set aside less land for parking. Table 51 outlines the scoring methodology.

Table 51. Scoring for parking requirements

| Requirements | Score (2 pts) |
|---|---|
| No minimum parking requirements are in place for new developments anywhere in the city | 2 |
| At least one zone, neighborhood, or district has no minimum parking requirements, or the whole city has a requirement of 0.5 spaces or fewer per unit | 1.5 |
| At least one zone, neighborhood, or district has a requirement of 0.5 or fewer spaces per unit, or the whole city has a requirement of 1 space or fewer per unit | 1 |
| At least one neighborhood has a requirement of 1 or fewer spaces per unit | 0.5 |

### Location Efficiency Information Disclosure and Incentives

Cities may use a number of incentives, ranging from tax credits to expedited permitting, to encourage compact growth and mixed-use projects. Such financial and nonmonetary policy levers can make these projects deeply attractive to developers. Financial incentives help promote transit oriented development or other community land use priorities in that they bring down the overall cost of construction in areas for which denser development is a priority. Commonly used measures include low-interest loans and property tax abatement programs. TOD projects become more financially attractive if developers can borrow at below-market interest rates. Likewise, property tax abatement programs lower overall costs, increasing the attractiveness of investing in projects that combine land uses and provide greater transportation options.

Commonly used nonfinancial measures such as density bonuses and expedited permitting similarly provide incentives for compact, mixed-use development. Expedited permitting fast-tracks the approval process for projects that meet certain location efficiency requirements. Density bonuses may be provided to projects meeting specific sustainability benchmarks and industry standards in their construction, and thus attract developers to the area. They authorize construction of a building with greater floor area than would otherwise be allowed. Developers may also be permitted to construct more market-rate housing units than would typically be allowed in exchange for each unit of affordable housing they build near transit nodes or in mixed-used communities (Shoemaker 2006).

Information and incentives for potential residents can also increase demand for communities that have better transportation choices. To attract potential residents to transit oriented development and mixed-use communities, cities may require disclosure of information on the location efficiency of buildings to potential buyers or tenants as a part of a real estate transaction or rental listing. Walk Score, for example, rates neighborhoods from 0 to 100 based on how walkable they are (Walk Score 2017). However this strategy is uncommon.

We gave credit to cities with a financial or nonfinancial incentive program for location-efficient development or a disclosure policy for location efficiency. Cities earned 0.5 points

for each incentive or policy, up to a maximum of 2 points. Table 52 lists the scores for location efficiency.

Table 52. Scores for location efficiency

| City | Location-efficient zoning (2 pts) | Parking requirements (2 pts) | Location efficiency incentives and information (2 pts) | Total score (6 pts) |
|---|---|---|---|---|
| Portland | 2 | 2 | 1.5 | 5.5 |
| Minneapolis | 2 | 1.5 | 1 | 4.5 |
| New York | 1 | 1.5 | 2 | 4.5 |
| Baltimore | 2 | 2 | 0 | 4 |
| Nashville | 2 | 1.5 | 0.5 | 4 |
| Austin | 1 | 1.5 | 1 | 3.5 |
| Boston | 1 | 1.5 | 1 | 3.5 |
| Cincinnati | 2 | 1.5 | 0 | 3.5 |
| Denver | 2 | 1.5 | 0 | 3.5 |
| Fort Worth | 2 | 0.5 | 1 | 3.5 |
| Kansas City | 2 | 1.5 | 0 | 3.5 |
| Phoenix | 1 | 1.5 | 1 | 3.5 |
| Seattle | 1 | 1.5 | 1 | 3.5 |
| Washington | 2 | 1.5 | 0 | 3.5 |
| Atlanta | 2 | 0.5 | 0.5 | 3 |
| Chicago | 1 | 1.5 | 0.5 | 3 |
| Columbus | 2 | 0.5 | 0.5 | 3 |
| Los Angeles | 1 | 1 | 1 | 3 |
| Milwaukee | 1 | 1.5 | 0.5 | 3 |
| Orlando | 2 | 0 | 1 | 3 |
| Raleigh | 2 | 1 | 0 | 3 |
| San Antonio | 1 | 0.5 | 1.5 | 3 |
| San Francisco | 0 | 2 | 1 | 3 |
| El Paso | 2 | 0.5 | 0 | 2.5 |
| Houston | 0 | 1 | 1.5 | 2.5 |
| Indianapolis | 1 | 0.5 | 1 | 2.5 |
| Memphis | 1 | 1.5 | 0 | 2.5 |
| Philadelphia | 1 | 1.5 | 0 | 2.5 |
| Providence | 1 | 1.5 | 0 | 2.5 |
| Richmond | 2 | 0.5 | 0 | 2.5 |
| Riverside | 1 | 0.5 | 1 | 2.5 |
| San Jose | 1 | 1 | 0.5 | 2.5 |
| Virginia Beach | 1 | 1.5 | 0 | 2.5 |
| Cleveland | 1 | 1 | 0 | 2 |
| Jacksonville | 2 | 0 | 0 | 2 |

| City | Location-efficient zoning (2 pts) | Parking requirements (2 pts) | Location efficiency incentives and information (2 pts) | Total score (6 pts) |
|---|---|---|---|---|
| Las Vegas | 1 | 0.5 | 0.5 | 2 |
| Miami | 2 | 0 | 0 | 2 |
| New Orleans | 1 | 1 | 0 | 2 |
| San Diego | 1 | 0.5 | 0.5 | 2 |
| Birmingham | 1 | 0.5 | 0 | 1.5 |
| Dallas | 1 | 0.5 | 0 | 1.5 |
| Hartford | 1 | 0.5 | 0 | 1.5 |
| Sacramento | 0 | 1 | 0.5 | 1.5 |
| Salt Lake City | 1 | 0.5 | 0 | 1.5 |
| St. Louis | 1 | 0.5 | 0 | 1.5 |
| Charlotte | 1 | 0 | 0 | 1 |
| Louisville | 0 | 1 | 0 | 1 |
| Pittsburgh | 0 | 1 | 0 | 1 |
| Tampa | 1 | 0 | 0 | 1 |
| Detroit | 0 | 0 | 0 | 0 |
| Oklahoma City | 0 | 0 | 0 | 0 |

## *MODE SHIFT*

More than 80% of all trips in the United States are made by private vehicles (DOT 2009). To improve the efficiency of a transportation system, cities must make efforts to implement policies that encourage other modes of transportation (e.g., public transit, ride sharing, bicycling, walking). This can be achieved through vehicle-sharing efforts and, more holistically, by ensuring that cities integrate land use and transportation planning.

### Mode Shift Targets and Strategy Implementation

Cities can use a number of policy levers to shift travel from personal vehicles to more efficient modes of transport, including modal share targets. Modal share targets aim to increase the percentage of trips taken using non-automobile modes of transportation. Cities that commit to long-run modal share targets can change the travel behavior of their communities in favor of modes of transportation that consume less energy.

Cities with codified modal share targets could earn 2 points. Some cities include these targets within their broader transportation plan or mobility plan, which we score for separately in the Sustainable Transportation Plan section. We awarded only 1 point if these targets were only part of a general sustainability plan but not codified through formal adoption. Table 53 lists the cities that received points for this metric, and table C6 in Appendix C includes an explanation of each of these targets.

### Complete Streets

Complete streets policies focus on the interconnectivity of streets to provide safe, easy access for pedestrians, bicyclists, motorists, and public transportation users. Complete streets

create a network of roads, sidewalks, and bicycle lanes that connect to transit facilities, making people less likely to drive, thereby lowering a community's fuel consumption and promoting economic development as nonvehicle transportation proliferates.

According to the National Complete Streets Coalition (NCSC), 30% of all trips in metropolitan areas are of one mile or less and can be made by walking or using other forms of non-automobile transportation. Using these alternatives reduces the need to own or fuel a car. Households located in neighborhoods near transit hubs with well-connected street networks drive, on average, 16 fewer miles per day than those located in traditional suburbs (NCSC 2011). Many states and municipalities have made an effort to incorporate complete streets policies into their land use planning tools. Thirty states and more than 663 individual municipalities have already adopted such policies to create safer, multimodal transportation networks (NCSC 2016).

ACEEE's scoring of complete streets policies in this report leverages the NCSC complete streets policy scores, which range from 0 to 100 according to the quality of the adopted policy (NCSC 2016). NCSC separates its rankings by policy types (resolution, city ordinance, and so on). In our scoring, a city that scored 75 or above on the NCSC complete streets policy score earned 2 points, one that scored between 50 and 75 earned 1.5 points, one that scored between 25 and 50 earned 1 point, and one that scored up to 25 earned 0.5 points. Table 53, below, lists the cities that earned points. Table C5 in Appendix C lists complete streets policy by city.

### Car and Bicycle Sharing

Car-sharing services give drivers access to shared vehicles on a time-limited basis as an alternative or supplement to vehicle ownership. The emergence of companies such as Zipcar, Car2Go, and others in recent years indicates that these services are becoming more popular with metropolitan residents who do not want the cost and maintenance burden of owning underused personal vehicles. Car sharing enables households to give up owning a first, second, or third vehicle and to rely on other modes of transportation. According to the Transportation Research Board, each shared car replaces at least five private vehicles (Mason, Fulton, and McDonald 2015).

Bicycle-sharing programs present commuters and city residents with another alternative to owning or driving a personal vehicle. Bike-sharing systems provide publicly accessible, shared-use bicycles that are available for trips of short to medium distance. Bike sharing increases the ease of urban mobility, increases the use of public transit, and reduces overall energy use within a metropolitan area (Shaheen and Martin 2015).

A city that operated or supported a car-sharing program earned 1 point, while a city with a program in the planning stages earned 0.5 points. A city with a bike-sharing program earned 1 point if the program was operational and 0.5 points if it was under development.

Table 53 lists the scores for mode shift.

Table 53. Scores for mode shift

| City | Mode shift targets (2 pts) | Complete streets (2 pts) | Car sharing (1 pt) | Bicycle sharing (1 pt) | Total score (6 pts) |
|---|---|---|---|---|---|
| Denver | 2 | 1.5 | 1 | 1 | 5.5 |
| Washington | 2 | 1.5 | 1 | 1 | 5.5 |
| Austin | 1 | 2 | 1 | 1 | 5 |
| Chicago | 2 | 1 | 1 | 1 | 5 |
| San Antonio | 2 | 1 | 1 | 1 | 5 |
| San Francisco | 2 | 1 | 1 | 1 | 5 |
| Atlanta | 2 | 0.5 | 1 | 1 | 4.5 |
| Boston | 2 | 0.5 | 1 | 1 | 4.5 |
| New York | 2 | 0.5 | 1 | 1 | 4.5 |
| Phoenix | 2 | 1.5 | 0 | 1 | 4.5 |
| Portland | 2 | 0.5 | 1 | 1 | 4.5 |
| Seattle | 1 | 1.5 | 1 | 1 | 4.5 |
| Indianapolis | 0 | 2 | 1 | 1 | 4 |
| Nashville | 1 | 1 | 1 | 1 | 4 |
| Philadelphia | 1 | 1 | 1 | 1 | 4 |
| Salt Lake City | 1 | 1 | 1 | 1 | 4 |
| San Diego | 2 | 0 | 1 | 1 | 4 |
| San Jose | 2 | 0 | 1 | 1 | 4 |
| Baltimore | 0 | 1.5 | 1 | 1 | 3.5 |
| Houston | 0 | 1.5 | 1 | 1 | 3.5 |
| Kansas City | 1 | 0.5 | 1 | 1 | 3.5 |
| Louisville | 1 | 0.5 | 1 | 1 | 3.5 |
| Minneapolis | 1 | 0.5 | 1 | 1 | 3.5 |
| Richmond | 0 | 2 | 1 | 0.5 | 3.5 |
| Birmingham | 0 | 2 | 0 | 1 | 3 |
| Cleveland | 0 | 1.5 | 0.5 | 1 | 3 |
| Columbus | 0 | 1 | 1 | 1 | 3 |
| Memphis | 0 | 1.5 | 1 | 0.5 | 3 |
| Milwaukee | 1 | 0 | 1 | 1 | 3 |
| New Orleans | 0 | 1.5 | 1 | 0.5 | 3 |
| Raleigh | 0 | 1.5 | 1 | 0.5 | 3 |
| St. Louis | 0 | 1.5 | 1 | 0.5 | 3 |
| Tampa | 0 | 1 | 1 | 1 | 3 |
| Fort Worth | 1 | 0.5 | 0 | 1 | 2.5 |
| Jacksonville | 1 | 0.5 | 1 | 0 | 2.5 |
| Miami | 0 | 0.5 | 1 | 1 | 2.5 |
| Cincinnati | 0 | 0 | 1 | 1 | 2 |
| Dallas | 0 | 0.5 | 1 | 0.5 | 2 |
| Las Vegas | 0 | 0 | 1 | 1 | 2 |

| City | Mode shift targets (2 pts) | Complete streets (2 pts) | Car sharing (1 pt) | Bicycle sharing (1 pt) | Total score (6 pts) |
|---|---|---|---|---|---|
| Los Angeles | 0 | 0 | 1 | 1 | 2 |
| Orlando | 0 | 0 | 1 | 1 | 2 |
| Pittsburgh | 0 | 0 | 1 | 1 | 2 |
| Providence | 0 | 0.5 | 1 | 0.5 | 2 |
| Detroit | 0 | 0 | 1 | 0.5 | 1.5 |
| Sacramento | 0 | 0 | 1 | 0.5 | 1.5 |
| Virginia Beach | 0 | 1.5 | 0 | 0 | 1.5 |
| Charlotte | 0 | 0 | 0 | 1 | 1 |
| El Paso | 0 | 0 | 0 | 1 | 1 |
| Hartford | 1 | 0 | 0 | 0 | 1 |
| Oklahoma City | 0 | 0 | 0 | 1 | 1 |
| Riverside | 1 | 0 | 0 | 0 | 1 |

*Source:* Complete streets data from NCSC 2016

## *TRANSIT*

Well-connected public transit networks reduce residents' need to drive and therefore the number of vehicle miles traveled in metropolitan areas. Although total transit ridership has declined recently, a number of cities have put significant effort into financing and expanding their transit infrastructure to reverse this trend (APTA 2016).

### Transportation Funding

Federal, state, and local transportation funding continues to grow year by year. Although much transportation funding comes from the federal and state levels, a number of municipalities across the United States have come up with inventive funding mechanisms to foster transit development with local funds. Local funding for transportation is generated in a variety of ways and can make up a significant portion of expenditures on transit expansion. Common strategies for funding transit include sales and property taxes, user fees, revenues from toll roads and parking pricing schemes, and transit fares. The city of Los Angeles generated $660 million in local funding from Measure R, a regional 0.5-cent sales tax approved by voter referendum (DeGood 2012). The sales tax is expected to generate $40 billion over its 30-year authorization, earmarked for a mix of new highway projects and construction of the Crenshaw/LAX light-rail line, which will reach completion in 2019 (LACMTA 2017).

We scored cities based on total transit funding per capita, using MSA population and an average of transit expenditures from 2011 to 2015 (as reported in the National Transit Database, FTA 2017). Table 54 outlines the scoring criteria.

Table 54. Scoring for transit funding

| Transit funding per capita | Score (3 pts) |
|---|---|
| ≥ $400 | 3 |
| ≥ $250 | 2.5 |
| ≥ $150 | 2 |
| ≥ $100 | 1.5 |
| ≥ $50 | 1 |
| ≥ $25 | 0.5 |
| < $25 | 0 |

### Access to Transit Service

The development of quality transit services, including adequate service frequency, is essential for public transit to be a viable option in a city. Efficient transit systems within metropolitan areas designed in connection with land use planning can make public transportation a viable substitute for automobile trips. To increase transit ridership and improve overall access to transit, local agencies can work to improve the frequency of service across multiple modes and ensure that coordination among modes and routes is in place so that the transit system is efficient, usable, and attractive to potential customers. Other strategies to increase transit ridership include price reductions and educational initiatives that highlight the benefits of using public transit.

We scored cities on their transit service using the Center for Neighborhood Technology's Transit Connectivity Index, which measures transit service levels based on the number of bus routes and train stations within walking distance of households and scaled by frequency of service (CNT 2016). A city earned up to 2 points. Table 5 outlines the scoring criteria for this metric, and table 56 lists scores for the two transit-related metrics.

Table 5. Scoring for access to transit service

| City's Transit Connectivity Index | Score (2 pts) |
|---|---|
| ≥ 40 | 2 |
| ≥ 30 | 1.5 |
| ≥ 15 | 1 |
| ≥ 5 | 0.5 |
| 0 | 0 |

*Source:* CNT 2016

Table 56. Scores for transit

| City | Transportation funding (3 pts) | Access to transit (2 pts) | Total score (5 pts) |
|---|---|---|---|
| Boston | 3 | 2 | 5 |
| New York | 3 | 2 | 5 |
| Denver | 3 | 1 | 4 |
| Salt Lake City | 3 | 1 | 4 |
| San Francisco | 2 | 2 | 4 |
| Washington | 2.5 | 1.5 | 4 |
| Baltimore | 2.5 | 1 | 3.5 |
| Chicago | 2 | 1.5 | 3.5 |
| Philadelphia | 2.5 | 1 | 3.5 |
| Portland | 2.5 | 1 | 3.5 |
| Seattle | 2.5 | 1 | 3.5 |
| Los Angeles | 2 | 1 | 3 |
| Minneapolis | 2 | 1 | 3 |
| Pittsburgh | 2 | 1 | 3 |
| San Jose | 2.5 | 0.5 | 3 |
| Atlanta | 1.5 | 1 | 2.5 |
| Cleveland | 1.5 | 1 | 2.5 |
| Milwaukee | 1.5 | 1 | 2.5 |
| St. Louis | 1.5 | 1 | 2.5 |
| Austin | 1.5 | 0.5 | 2 |
| Dallas | 1.5 | 0.5 | 2 |
| Hartford | 1 | 1 | 2 |
| Houston | 1.5 | 0.5 | 2 |
| Las Vegas | 1.5 | 0.5 | 2 |
| Miami | 1 | 1 | 2 |
| New Orleans | 1 | 1 | 2 |
| Providence | 1 | 1 | 2 |
| San Diego | 1.5 | 0.5 | 2 |
| Charlotte | 1 | 0.5 | 1.5 |
| Cincinnati | 1 | 0.5 | 1.5 |
| Columbus | 1 | 0.5 | 1.5 |
| El Paso | 1 | 0.5 | 1.5 |
| Jacksonville | 1 | 0.5 | 1.5 |
| Louisville | 1 | 0.5 | 1.5 |
| Memphis | 1 | 0.5 | 1.5 |
| Orlando | 1 | 0.5 | 1.5 |
| Richmond | 0.5 | 1 | 1.5 |
| Sacramento | 1 | 0.5 | 1.5 |
| San Antonio | 1 | 0.5 | 1.5 |

| City | Transportation funding (3 pts) | Access to transit (2 pts) | Total score (5 pts) |
|---|---|---|---|
| Detroit | 0.5 | 0.5 | 1 |
| Indianapolis | 0.5 | 0.5 | 1 |
| Kansas City | 0.5 | 0.5 | 1 |
| Nashville | 0.5 | 0.5 | 1 |
| Phoenix | 0.5 | 0.5 | 1 |
| Raleigh | 0.5 | 0.5 | 1 |
| Tampa | 0.5 | 0.5 | 1 |
| Virginia Beach | 1 | 0 | 1 |
| Birmingham | 0.5 | 0 | 0.5 |
| Riverside | 0 | 0.5 | 0.5 |
| Fort Worth | 0 | 0 | 0 |
| Oklahoma City | 0 | 0 | 0 |

*Source:* FTA 2017; CNT 2016.

## *EFFICIENT VEHICLES*

The US vehicle market has seen an increase in high-efficiency options for consumers in recent years. Manufacturers are maximizing the efficiency of conventional internal-combustion vehicles, and many more hybrids, plug-in hybrids, and electric vehicles are now available for sale in dealerships across the country. While these vehicle types provide significant energy-saving opportunities, plug-in electric vehicles that require charging stations also present infrastructure challenges.

In this section, we evaluated cities based on their efficient-vehicle purchase policies and electric vehicle readiness policies, including incentives in place for installing electric vehicle charging stations. Government vehicle fleet procurement is included not in this chapter but in Chapter 2, Local Government Operations.

### Incentives for and Investment in Energy-Efficient Vehicles and Vehicle-Charging Infrastructure

A key barrier to entry in the market for technologically advanced, fuel-efficient vehicles is high cost. To encourage consumers to purchase these vehicles, financial incentives, including tax credits, rebates, and sales tax exemptions, are important policy levers. Currently, the federal government provides the largest incentives, followed by state incentives. However a few cities across the country further subsidize the cost of these vehicles with supplemental incentives. Los Angeles, for example, provides incentives for residential and commercial EV chargers. Additionally, the arrival of a variety of new electric and plug-in hybrid electric models from car manufacturers such as BMW, Ford, Honda, and Nissan to the American vehicle market has increased the need for a comprehensive network of electric charging stations. As a result, a number of cities have begun evaluating their EV readiness with tools such as the DOE Plug-In Electric Vehicle Readiness Scorecard (DOE 2016c). They have also begun developing policies to enable the installation and availability of charging sites.

We award cities 1 point if they provided purchase incentives for hybrid, plug-in hybrid, or electric vehicles—all vehicle types that typically have high fuel efficiency—or for conventional vehicles with high fuel efficiency. While alternative-fuel vehicles—those that use ethanol or compressed natural gas—can provide substantial environmental benefits by reducing pollution, they do not generally improve vehicle fuel efficiency.[27] Therefore policies to promote the purchase of alternative-fuel vehicles, but not the purchase of high-efficiency vehicles, did not receive a point. We also do not give credit for incentives such as the use of high-occupancy-vehicle lanes and preferred parking programs for high-efficiency and electric vehicles, as they can promote increased automobile use and consequently may have no net energy benefit.

A city also earned 1 point if it had an incentive program, such as a rebate program, to support the implementation of electric vehicle charging infrastructure.

Finally, we awarded up to 1 point based on the number of charging stations available to the public. Cities with 50 or more charging stations earned the full 1 point. Cities with 20 to 49 charging stations available earned 0.5 points.

Table 57 lists the scores for efficient vehicles.

**Table 57. Scores for efficient vehicles**

| City | Vehicle purchase incentives (1 pt) | Vehicle infrastructure incentives (1 pt) | EV charging locations (1 pt) | Total score (3 pts) |
|---|---|---|---|---|
| Chicago | 1 | 1 | 1 | 3 |
| Atlanta | 0 | 1 | 1 | 2 |
| Austin | 0 | 1 | 1 | 2 |
| Boston | 0 | 1 | 1 | 2 |
| Denver | 0 | 1 | 1 | 2 |
| Los Angeles | 0 | 1 | 1 | 2 |
| New York | 0 | 1 | 1 | 2 |
| Portland | 0 | 1 | 1 | 2 |
| Seattle | 0 | 1 | 1 | 2 |
| Washington | 1 | 0 | 1 | 2 |
| Jacksonville | 1 | 0 | 0.5 | 1.5 |
| Riverside | 1 | 0 | 0.5 | 1.5 |
| Baltimore | 0 | 0 | 1 | 1 |
| Charlotte | 0 | 0 | 1 | 1 |
| Dallas | 0 | 0 | 1 | 1 |
| Houston | 0 | 0 | 1 | 1 |
| Kansas City | 0 | 0 | 1 | 1 |
| Las Vegas | 0 | 0 | 1 | 1 |

[27] Ethanol and compressed natural gas have lower energy content per gallon of fuel than an equivalent gallon of gasoline or diesel. Therefore vehicles that run on these fuels achieve fewer miles per gallon burned.

| City | Vehicle purchase incentives (1 pt) | Vehicle infrastructure incentives (1 pt) | EV charging locations (1 pt) | Total score (3 pts) |
|---|---|---|---|---|
| Minneapolis | 0 | 0 | 1 | 1 |
| Nashville | 0 | 0 | 1 | 1 |
| Orlando | 0 | 0 | 1 | 1 |
| Phoenix | 0 | 0 | 1 | 1 |
| Raleigh | 0 | 0 | 1 | 1 |
| Sacramento | 0 | 0 | 1 | 1 |
| San Antonio | 0 | 0 | 1 | 1 |
| San Diego | 0 | 0 | 1 | 1 |
| San Francisco | 0 | 0 | 1 | 1 |
| San Jose | 0 | 0 | 1 | 1 |
| Tampa | 0 | 0 | 1 | 1 |
| Cincinnati | 0 | 0 | 0.5 | 0.5 |
| Columbus | 0 | 0 | 0.5 | 0.5 |
| Detroit | 0 | 0 | 0.5 | 0.5 |
| El Paso | 0 | 0 | 0.5 | 0.5 |
| Indianapolis | 0 | 0 | 0.5 | 0.5 |
| Miami | 0 | 0 | 0.5 | 0.5 |
| Milwaukee | 0.5 | 0 | 0 | 0.5 |
| Philadelphia | 0 | 0 | 0.5 | 0.5 |
| Pittsburgh | 0 | 0 | 0.5 | 0.5 |
| Richmond | 0 | 0 | 0.5 | 0.5 |
| Salt Lake City | 0 | 0 | 0.5 | 0.5 |
| Virginia Beach | 0 | 0 | 0.5 | 0.5 |
| Birmingham | 0 | 0 | 0 | 0 |
| Cleveland | 0 | 0 | 0 | 0 |
| Fort Worth | 0 | 0 | 0 | 0 |
| Hartford | 0 | 0 | 0 | 0 |
| Louisville | 0 | 0 | 0 | 0 |
| Memphis | 0 | 0 | 0 | 0 |
| New Orleans | 0 | 0 | 0 | 0 |
| Oklahoma City | 0 | 0 | 0 | 0 |
| Providence | 0 | 0 | 0 | 0 |
| St. Louis | 0 | 0 | 0 | 0 |

*Source:* EV charging locations data from DOE 2016a

### *FREIGHT SYSTEM EFFICIENCY*

Freight movement accounts for 18% of oil consumption in the United States (Foster and Langer 2013) and offers substantial opportunities for energy efficiency gains. In 2016, the Environmental Protection Agency and the Department of Transportation adopted the second phase of the fuel efficiency and GHG standards for medium- and heavy-duty vehicles. While Phase 1 and Phase 2 of the standards have the potential to improve vehicle

fuel economy by up to 48% between model years 2010 and 2027 (depending on vehicle type), additional steps can be taken to improve the overall efficiency of the freight system.

Because the majority of Americans live in metropolitan areas, urban areas are major sources and destinations for freight. Policies and infrastructure for the movement of freight in cities and their metropolitan areas can facilitate improvements in efficiency. Strategies that reduce the fuel used in the movement of goods, such as load consolidation and streamlining logistics, are particularly useful for improving the overall efficiency of the freight system.

### Encouraging Energy-Efficient Freight Deliveries

Locally developed freight plans can go above and beyond state freight requirements and policies. They can serve as the foundation for strategies to increase freight efficiency, which may include truck loading plans, multimodal requirements, street design, last-mile delivery solutions, zoning provisions, or off-hour delivery programs (Hillier et al. 2012). Each strategy positively affects freight efficiency, but a plan with a comprehensive package of strategies can result in greater fuel savings.

We awarded a city 2 points if it had a stand-alone sustainable freight plan or a freight mobility plan outlining multiple strategies to increase efficiency. We awarded a city 1 point if it did not have a freight plan but still pursued at least one freight efficiency strategy. Strategies for which we awarded points include incentives for multimodal freight, clean vehicle technology standards, low-emission zones, and urban consolidation centers (micro hubs to which shippers send deliveries, rather than sending them directly to the recipient's building). We also awarded points for last-mile solutions or off-hours delivery programs.

### Freight ICT

Advances in information and communications technologies (ICT) have enabled better coordination between shippers and carriers of freight cargo. ICT has had a much bigger role in the trucking industry than in other modes of freight because it is the largest consumer of energy among all freight modes. Internet-based applications and services such as Transfix and Convoy have spurred the transformation of the freight industry.[28] These platforms can connect shippers and carriers directly and can provide freight carriers with dynamic, real-time road updates, minimizing the time spent in traffic and thereby reducing fuel consumption (Transfix 2016).

Cities earned 1 point if they had some form of Internet-based application or service that helped coordinate freight transportation.

Table 58 lists scores for sustainable freight.

[28] Convoy and Transfix are applications that function as brokers between shippers and truckers. They both employ GPS-based technology to find the most efficient route and load in order to ensure efficiency and cost savings.

Table 58. Scores for sustainable freight

| City | Freight plan (2 pts) | Freight ICT (1 pt) | Total score (3 pts) |
|---|---|---|---|
| New York | 2 | 1 | 3 |
| Portland | 2 | 0 | 2 |
| Seattle | 2 | 0 | 2 |
| Philadelphia | 1 | 0 | 1 |
| Chicago | 1 | 0 | 1 |
| Jacksonville | 1 | 0 | 1 |
| Los Angeles | 1 | 0 | 1 |
| Louisville | 1 | 0 | 1 |
| Miami | 1 | 0 | 1 |
| Minneapolis | 1 | 0 | 1 |
| Riverside | 1 | 0 | 1 |
| St. Louis | 1 | 0 | 1 |
| Austin | 0 | 1 | 1 |
| Richmond | 0 | 1 | 1 |
| Memphis | 0.5 | 0 | 0.5 |
| Columbus | 0 | 0.5 | 0.5 |
| Houston | 0 | 0.5 | 0.5 |
| Atlanta | 0 | 0 | 0 |
| Kansas City | 0 | 0 | 0 |
| Raleigh | 0 | 0 | 0 |
| Boston | 0 | 0 | 0 |
| Baltimore | 0 | 0 | 0 |
| Birmingham | 0 | 0 | 0 |
| Charlotte | 0 | 0 | 0 |
| Cincinnati | 0 | 0 | 0 |
| Cleveland | 0 | 0 | 0 |
| Dallas | 0 | 0 | 0 |
| Denver | 0 | 0 | 0 |
| Detroit | 0 | 0 | 0 |
| El Paso | 0 | 0 | 0 |
| Fort Worth | 0 | 0 | 0 |
| Hartford | 0 | 0 | 0 |
| Indianapolis | 0 | 0 | 0 |
| Las Vegas | 0 | 0 | 0 |
| Milwaukee | 0 | 0 | 0 |

| City | Freight plan (2 pts) | Freight ICT (1 pt) | Total score (3 pts) |
|---|---|---|---|
| Nashville | 0 | 0 | 0 |
| New Orleans | 0 | 0 | 0 |
| Oklahoma City | 0 | 0 | 0 |
| Orlando | 0 | 0 | 0 |
| Phoenix | 0 | 0 | 0 |
| Pittsburgh | 0 | 0 | 0 |
| Providence | 0 | 0 | 0 |
| Sacramento | 0 | 0 | 0 |
| Salt Lake City | 0 | 0 | 0 |
| San Antonio | 0 | 0 | 0 |
| San Diego | 0 | 0 | 0 |
| San Francisco | 0 | 0 | 0 |
| San Jose | 0 | 0 | 0 |
| Tampa | 0 | 0 | 0 |
| Virginia Beach | 0 | 0 | 0 |
| Washington | 0 | 0 | 0 |

### *AFFORDABLE HOUSING IN TRANSIT-ORIENTED DEVELOPMENTS*

As cities have sprawled and jobs have moved away from urban cores, many low-income communities have become geographically more isolated and inadequately served by affordable, efficient transportation. These communities' transportation options are often limited to automobiles. Expenditures for vehicles, including fuel consumption, insurance, and maintenance, can be large and unpredictable for these households (Vaidyanathan 2016). Cities can increase transit access for low-income communities by implementing policies that require affordable housing for new developments in transit oriented areas or by preserving existing affordable housing in transit areas.

Cities could earn up to 3 points in this category. Cities earned 1 point for each requirement or incentive that encourages the creation of affordable housing in transit-served areas. Cities earned 0.5 points for each voluntary program or effort in place. Table 59 lists scores for affordable housing in transit-oriented developments.

Table 59. Scoring for affordable TOD housing

| City | Score (3 pts) |
|---|---|
| Los Angeles | 3 |
| New York | 3 |
| Portland | 3 |
| Atlanta | 2 |
| Boston | 2 |
| Chicago | 2 |
| Dallas | 2 |
| Phoenix | 2 |
| Houston | 1.5 |
| Minneapolis | 1.5 |
| Raleigh | 1.5 |
| Seattle | 1.5 |
| Austin | 1 |
| Charlotte | 1 |
| Denver | 1 |
| Fort Worth | 1 |
| Indianapolis | 1 |
| Louisville | 1 |
| Nashville | 1 |
| Philadelphia | 1 |
| San Diego | 1 |
| San Francisco | 1 |
| Tampa | 1 |
| Washington | 1 |
| Pittsburgh | 0.5 |
| Baltimore | 0 |
| Birmingham | 0 |
| Cincinnati | 0 |
| Cleveland | 0 |
| Columbus | 0 |
| Detroit | 0 |
| El Paso | 0 |
| Hartford | 0 |
| Jacksonville | 0 |
| Kansas City | 0 |
| Las Vegas | 0 |
| Memphis | 0 |
| Miami | 0 |
| Milwaukee | 0 |

| City | Score (3 pts) |
|---|---|
| New Orleans | 0 |
| Oklahoma City | 0 |
| Orlando | 0 |
| Providence | 0 |
| Richmond | 0 |
| Riverside | 0 |
| Sacramento | 0 |
| Salt Lake City | 0 |
| San Antonio | 0 |
| San Jose | 0 |
| St. Louis | 0 |
| Virginia Beach | 0 |

### Leading Cities: Transportation Policies

**Portland.** The 2015 Portland Climate Action Plan, adopted by the city council, includes a goal to reduce transportation-related carbon emissions to 40% below 1990 levels by 2030. Additionally, Portland set a goal to achieve 70% of commutes by transit, carpool, biking, or walking by 2030. This commute mode goal places heavy emphasis on the use of public transit and bicycle commuting in the future, aiming to increase their travel share to 25% each. The city is also updating its 2035 Transportation System Plan in three phases. The first phase has been completed and includes specific sustainable transportation policies such as goals for mode share and VMT reduction. In addition, Portland has a Sustainable Freight Strategy in place that outlines approaches to increasing its freight efficiency, including last-mile solutions, centralized freight distribution districts, and off-hours delivery. The city also aids affordable housing development by offering a tax abatement for construction of residences within a half-mile of light-rail station areas.

**New York.** New York's Roadmap to 80 x 50 incorporates a vision for reducing private VMT by prioritizing low-carbon and sustainable modes of transportation and emphasizing shared forms of mobility. Although the plan does not call out specific VMT or GHG reduction targets for the transportation sector, it contains a codified target of 80% for all person-trips to be made by walking, bicycling, or public transit by 2050. Additionally, the city employs sustainable freight strategies across multiple city agencies and sets out a vision for increasing the efficiency of its freight in the 80 x 50 Roadmap. New York also received points for affordable housing in transit-oriented developments for its Inclusionary Housing Program. The program includes several incentives to encourage developers to build affordable homes in transit-served areas.

**Austin.** Austin was one of the most- improved cities in transportation in this edition of the *Scorecard*, boosting its performance by 4.5 points for 2017. This improvement is tied to ACEEE's recognition of the city's Imagine Austin Plan, which was adopted in 2015. The plan includes a GHG emissions goal as well as strategies to build mixed-use communities to reduce VMT and encourage all modes of transportation. Austin was also one of the few cities to offer incentives for installing electric vehicle charging stations at homes, businesses, multifamily properties, and auto dealerships. As a result, the city has a robust network of more than 250 charging stations.

# Chapter 7. City Energy Performance: Examining Energy Consumption Data

Lead Authors: Weston Berg and David Ribeiro

## *INTRODUCTION*

The metrics we used to score cities in this report measured policies or other actions cities take or support to promote energy efficiency. In contrast, this chapter discusses cities' actual energy consumption and energy performance, both citywide and in its local government operations. We have not factored the findings from this chapter into city scoring. They are included here, though, because an understanding of energy performance and how energy is used in a given city is critical for its strategic energy planning and for evaluating the impact of its energy-related policies.

Our analysis is an attempt to compare city energy performance across a selection of cities based on imperfect and incomplete energy consumption data. Generally, the analysis is limited due to variation and lack of standardization in self-reported data provided by cities. We see two major limitations to the data. First, the energy context and performance of any city is shaped not just by its policies, but also by the characteristics of its built environment, economy, regional energy supply, and climate and how these factors change over time. Cities rarely account for the impact of these factors on their energy consumption when they publicly report their energy data.

Second, the availability and consistency of city energy data are limited. Cities are gaining a better understanding of their GHG emissions, but it is still difficult to compare energy consumption across cities. Standards for developing city emissions and energy inventories are emerging, most notably the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC), but the adoption of these standards is still in its infancy, and a variety of other GHG accounting and reporting standards also exist.[29] A new tool, the State and Local Energy Data (SLED) Tool, provides local estimates of energy consumption figures based on state-level EIA data and small-area Census estimates of energy usage (DOE 2017b).[30] The tool greatly increases the availability of local energy data; we do not use data from the SLED tool, though, since they are estimates. The energy data that cities self-report in GHG inventories, and which we rely on, are also difficult to validate. However energy data that cities self-report in GHG inventories remain the best-source data and form the basis of our analysis.

[29] The GPC is an international accounting system that governments and businesses can use to calculate and manage their GHG emissions (Fong et al. 2014)

[30] The SLED Tool is available at apps1.eere.energy.gov/sled/#/. The tool provides local energy profiles including data on electricity generation, energy efficiency, renewable energy generation, transportation fuel sources and costs, and other community planning resources. Local figures for residential and commercial electricity and natural gas consumption and expenditures are estimates based on spatial refinement methodology performed by NREL. These calculations integrate state-level utility data, published by EIA, along with small-area estimates of energy usage from the American Community Survey (ACS), Commercial Buildings Energy Consumption Survey (CBECS) data, and US Census Bureau Zip Code Business Patterns.

As a result of these data limitations, we cannot present a full comparative picture of energy consumption in all of the cities we assessed. However where data were available from GHG inventories or other public sources, we attempt to show the energy consumed within each city and identify trends in energy consumption. We conclude by making recommendations on ways cities could improve their energy data reporting going forward.

### *METHODOLOGY, LIMITATIONS, AND INTERPRETING RESULTS*

For our analysis, we relied on energy consumption data reported in local government operations and citywide GHG inventories. Only a handful of cities we assessed published stand-alone energy inventories for their energy consumption separate from their GHG inventories.[31]

Using the energy consumption data available from inventories and US Census Bureau data on historic city populations (Census 2016b), we calculated total citywide and local government operations energy use per capita and energy use per capita for specific end uses (including buildings and transportation). Energy consumption is often presented in terms of energy productivity or energy intensity, defined as energy consumption per unit of economic output. There was no easily accessible measure of cities' gross domestic product for all of the years for which we have consumption data, so we chose to use population to normalize energy consumption. We display energy consumption levels for citywide and local government operations in figures 7 and 9 later in this chapter. We also include energy consumption per capita for all cities with available data on ACEEE's State and Local Policy Database.[32]

Due to data inconsistencies in the energy consumption data cities self-report, there are two major limitations with our calculations. First, cities use different energy units to measure their consumption across similar sectors. For example, Boston reports its energy consumption by on-road vehicles in VMT, but Minneapolis reports its consumption by vehicles in gallons of diesel and gasoline consumed.[33] We found similar issues in energy data reported for the buildings sector.[34]

Second, different cities included different sectors in their inventories. To account for these differences, we included sectors in our calculations only if energy consumption in those sectors was widely reported by other cities. For citywide consumption, this meant we excluded energy used for waste management, air travel and airports, marine transportation, and transit system electricity use. For local government operations, we excluded energy

[31] In response to our *City Scorecard* data request, city staff in Denver, Portland, and Richmond provided data on the city's energy consumption even though the data were not formally published.

[32] This database can be found at database.aceee.org/sites/default/files/docs/local-energy-data.pdf.

[33] We converted VMT to British thermal units (Btus) using the national average for passenger cars (5,342 Btus per VMT) and transit buses (35,953 Btus per VMT) as reported in the 2012 Transportation Energy Data Book (Davis et al. 2012, table 2.12). Population numbers used for per capita calculations are from the corresponding year in the US Census population estimates, accessed through American FactFinder or Census 2016b.

[34] We converted all energy units to a common unit, million Btus (MMBtus), so we could present energy consumption using a consistent measure.

used for airport operations, water delivery and wastewater treatment, streetlights, and employee commutes to work.

For cities with multiple years of energy consumption data, we calculated the average percentage change in energy consumption per capita. Cities should be primarily measured against trends in their own energy use because a variety of factors could skew comparisons across cities. Differences in each city's local context, such as the makeup of the existing building stock, the energy intensity of the local economy, and weather patterns, affect energy consumption patterns. Also, cities whose populations and economic activity increase over time may see higher energy consumption than do cities with stagnant growth. The data we use are taken from inventories that generally do not normalize for these factors, nor do we normalize the data to account for these changes.

Furthermore, data accuracy may vary. Some cities, including Boston and New York, have released annual GHG inventories for several years. Their familiarity with processes used in inventorying and publishing energy consumption could yield more accurate results due to a refined methodology, increased frequency of reporting, and improved data collection methods. Other cities have published a single report that inventories multiple years. As with any data-driven project undertaken for the first time, there is a larger chance of data quality issues and missteps in execution. Cities that rely on backcasting to establish a baseline energy consumption level are subject to further uncertainty. Finally, another major limitation is that the actual baseline year for each city's inventory differed substantially, from 1990 in one case to 2006 in another.

For these reasons, we caution against comparing across cities when looking at changes over time. Instead, we recommend examining each city's results against its results in other years. For ease of presenting the results, however, we display data from multiple cities in figures that follow. We display the results for citywide and local government operations energy consumption in figures 8 and 10 as the percentage change from the cities' first inventories (i.e., baseline year).

## *RESULTS*

### Citywide Energy Consumption

Total citywide energy use (generally consisting of data from the transportation and building sectors) for at least one year was available from 20 cities—the same ones for which data were available for the *2015 Scorecard* plus Atlanta, Austin, Las Vegas, Nashville, Richmond, and Riverside. As shown in figure 6, the predominant energy end use varies from city to city. Figure 6 shows the share of total energy consumption by the residential, commercial and industrial, and transportation sectors for the most recent year available from the 20 cities reporting energy data on each sector. The most recent year available ranged from 2005 to 2015 (see figure 6 for actual year of data).

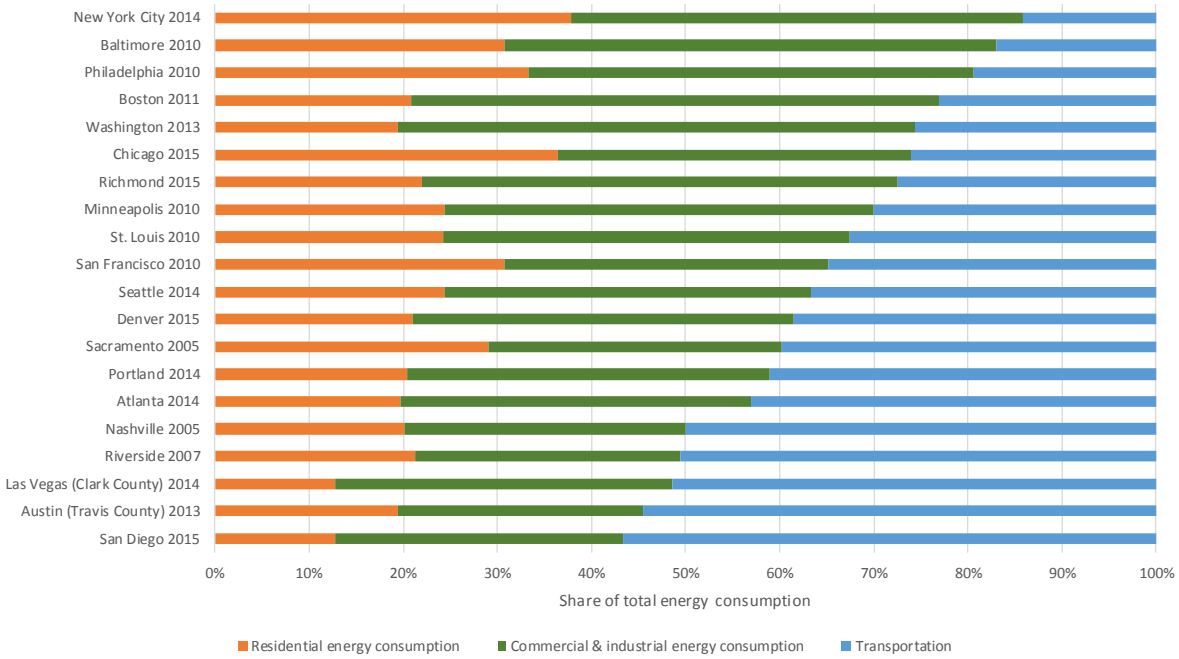


Figure 6. Share of citywide energy consumption by sector. Data shown are from the most recent year available from city GHG inventories. Differences in how individual cities defined sectors could lead to variations in which end uses are included in each of the different sectors. Several cities (including Boston, Philadelphia, and Seattle) do not report commercial and industrial (C&I) energy consumption separately, but only combined. For this reason, we present only combined C&I for all cities even if they reported it separately in inventories. *Sources:* We gathered data on energy use levels in cities from the following GHG inventories and sustainability plans: Pasion, Amar, and Zhou 2016; Baltimore 2013; Dews and Wu 2012; Boston 2013a; District of Columbia 2014a; Chicago 2016; City of Richmond, pers. comm., November 2016; Minneapolis 2012; St. Louis 2012; San Francisco 2012; Erickson, Down, and Broekhoiff 2014; City of Denver, pers. comm., November 16, 2016; ICF Jones and Stokes 2009; M. Armstrong, Portland Bureau of Planning and Sustainability, pers. comm., November 2016; Atlanta 2016; Metropolitan Government of Nashville and Davidson County Health Department 2009; Riverside 2010; Stephen and Hoyuela-Alcaraz 2015; City of Austin, pers. comm., November 2016; EPIC 2016.

Residential and commercial/industrial buildings accounted for at least half of total energy use in all the cities except San Diego, Austin (Travis County), Las Vegas (Clark County), and Riverside. Given that two of these four cities reported energy use at the county level, it should not be surprising that the relatively large land areas inventoried would capture a higher percentage of transportation-related energy use. The commercial and industrial (C&I) sector contributed more to energy consumption than residential buildings in all cities in figure 6. On average, across these 20 cities, transportation accounts for 36% of total energy consumption and buildings account for 64%. To further break down the buildings sector, on average residential buildings account for 24% of total energy use and the C&I sector accounts for 40%

Of the 20 cities whose total energy use data were available, 10 released new reports or made available new data since the last *Scorecard*. This indicates that, though limited availability of comprehensive energy use data continues to challenge efforts to assess energy performance trends, efforts are increasing among cities to report emissions and update and refine inventories based on current methodologies. Several cities with GHG inventories reported emissions by sector but did not provide the underlying energy use and therefore are not

shown here. Six additional cities reported energy use for one or more individual sectors but not for the entire community.[35]

For the 20 cities with available data, we present their citywide energy consumption per capita from their most recent year inventoried in figure 7. Chicago, Richmond, Denver, and San Diego have the most recent published energy data (from 2015). For Sacramento, on the other hand, the most recent year for which data were available was 2005. As discussed earlier, this difference in reporting year is one of the limiting factors when comparing energy consumption across cities.

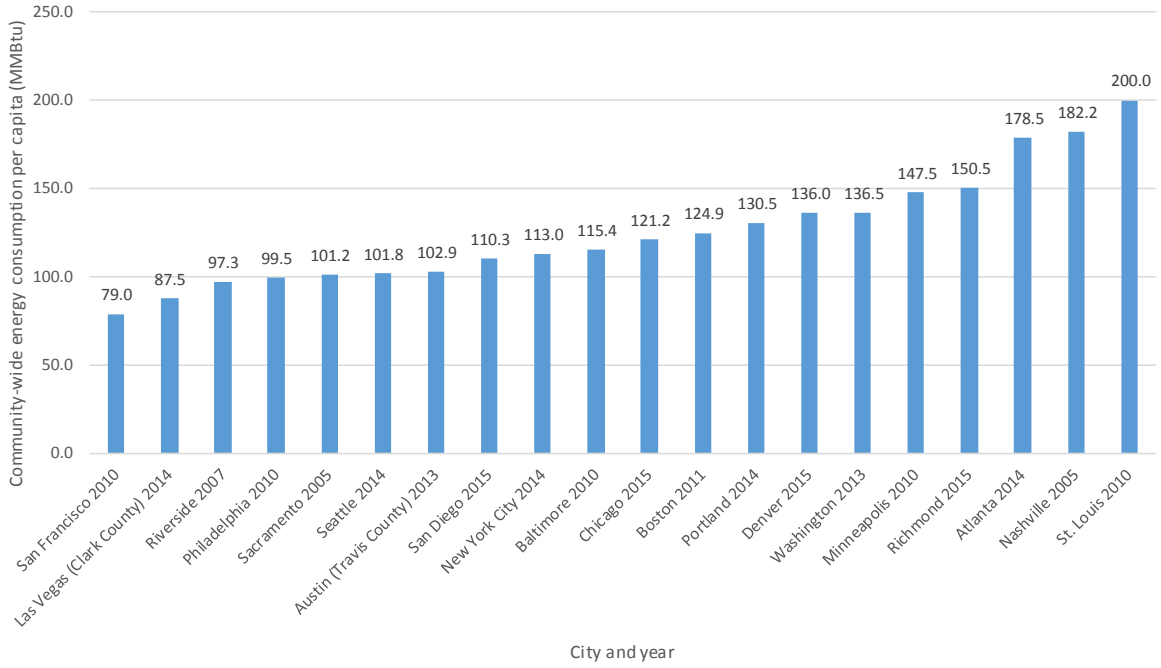


Figure 7. Citywide energy consumption per capita in most recent year available. See the methodology section of this chapter for the assumptions we used in the calculations and the limitations of the data. *Sources:* We gathered data on energy use levels in cities from the following GHG inventories and sustainability plans: San Francisco 2012; Stephen and Hoyuela-Alcaraz 2015; Riverside 2010; Dews and Wu 2012; ICF Jones and Stokes 2009; Seattle 2016; City of Austin, pers. comm., November 2016; EPIC 2016; Pasion, Amar, and Zhou 2016; Baltimore 2013; Chicago 2016; Boston 2013a; Portland Bureau of Planning and Sustainability, pers. comm., November 2016; City of Denver, pers. comm., November 16, 2016; District of Columbia 2014a; Minneapolis 2012; City of Richmond, pers. comm., November 2016; Atlanta 2016; St. Louis 2012.

Of the 20 cities in figure 7, Saint Louis, Nashville, and Atlanta reported the highest per capita energy consumption—all three exceeding 175 MMBtu per capita—and San Francisco reported the lowest (79.0 MMBtu). Three of the five cities with the lowest energy consumption per capita are located in marine (San Francisco) and "hot-dry" (Sacramento, Riverside, and Las Vegas) climate zones as delineated by DOE's Building American program (PNNL 2010). However Philadelphia, also ranking among the lowest on this list, has a very different mixed-humid climate. The three cities with the highest per capita energy consumption are also located in mixed-humid climates.

[35] These were Detroit, Los Angeles, Louisville, Oklahoma City, Raleigh, and San Jose.

The data highlight a possible link between population density and energy consumption, though the relationship is marked by a number of exceptions and countervailing factors. Five out of the six cities with the lowest population densities (Nashville, Atlanta, Richmond, Saint Louis, and Minneapolis) had the highest levels of per capita energy consumption. This is not surprising; more sprawling cities tend to be more automobile dependent, and studies find that areas that are more geographically concentrated have lower levels of electricity usage and lower emissions (Glaeser and Kahn 2010). Consistent with these findings, both San Francisco and Philadelphia, which had among the highest population-weighted densities of any of the 20 cities in figure 7, reported particularly low per capita energy consumption (Census 2016a).

However the data also yield several deviations from this trend. For example, New York, despite having the highest population density of all the cities surveyed, reported moderate per capita energy consumption levels. This could point to the impacts of winter weather extremes in northern states, and the finding of Glaeser and Kahn (2010) that though older dense cities tend to have lower emissions, this does not hold true if they are particularly cold.

The data may also point to the important impacts of policy interventions to support sustainable development. For example, three of the five cities with the lowest per capita energy consumption in Figure 7 are located in California, a state that has long been a leader in enacting regulations to strengthen energy efficiency and reduce GHG emissions. Policy drivers such as nation-leading vehicle emissions standards and fuel economy regulations; AB 32 (the 2006 Global Warming Solutions Act), which aims to reduce carbon emissions to 1990 levels by 2020; and more recently the ambitious efficiency goals established in SB 350 will continue to generate and accelerate actions to reduce energy consumption. However, without a more robust analysis of exogenous factors and variations in reporting methodology, we cannot pinpoint causes for different energy consumption levels.

While few cities had data for overall citywide energy consumption, fewer still—just 12—had data for multiple years. Figure 8 shows the percentage change in total energy consumption per capita from each city's baseline. As discussed earlier, there are many limitations and caveats to these data on trends over time. We present them here as initial results for further exploration, and we make some initial observations.

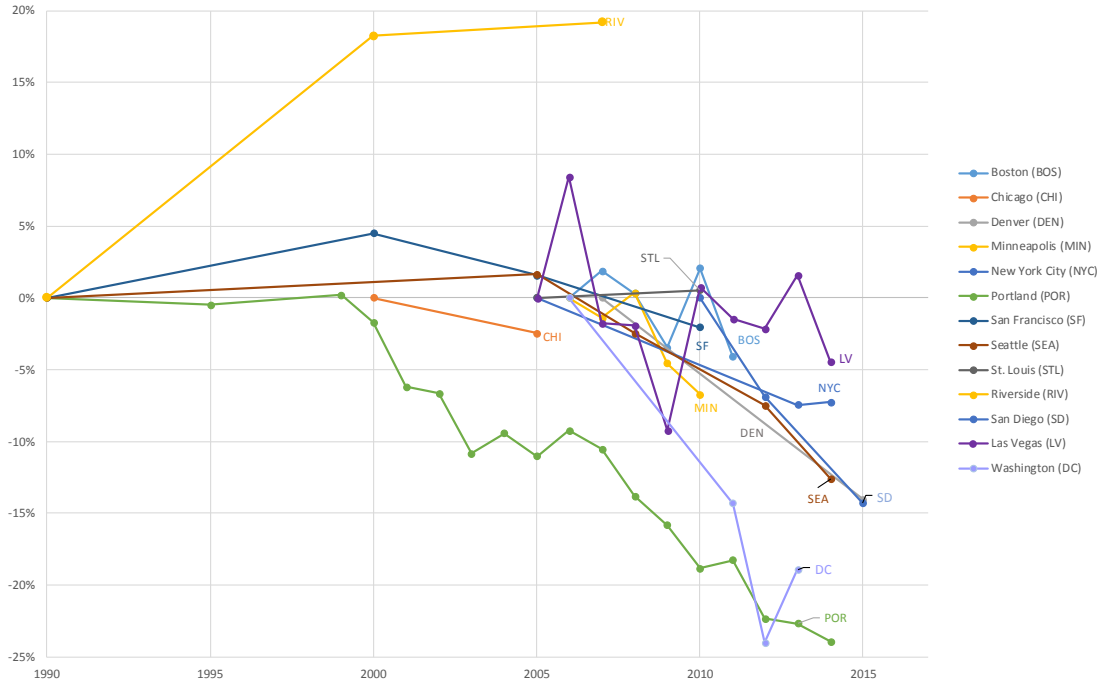


**Figure 8. Percentage change in total citywide energy consumption per capita. Data shown are changes in total energy consumption as calculated from data reported in city GHG inventories, excluding energy used for waste management, air transportation, and marine transportation. Transit system electricity use was excluded in most cases, except for Portland, which reports energy use from light-rail transit as part of commercial energy use figures. We calculated all percentage changes from levels in the baseline year. For those cities with more than two years' data, we calculated the percentage changes associated with the third and any subsequent data points from the baseline year rather than from the preceding data point. *Sources:* We calculated the percentage change in citywide energy consumption per capita using data from the following sources: Boston 2013a; ICF International 2012; Ramaswami et al. 2007; City of Denver, pers. comm., November 16, 2016; Minneapolis 2012; Pasion, Amar, and Zhou 2016; M. Armstrong, Portland Bureau of Planning and Sustainability, pers. comm., November, 2016; San Francisco 2012; Seattle 2016; St. Louis 2012; District of Columbia 2014a; Stephen and Hoyuela-Alcaraz 2015.**

Ten of the 12 cities reporting data for multiple years posted net decreases in per capita energy consumption over the reporting period. Washington, DC, Minneapolis, Seattle, Portland, and San Diego reported the largest percentage declines in energy consumption per capita. Portland experienced the greatest overall reduction in citywide energy use (23.9%) with a steady, gradual annual average reduction of 1.0% over 24 years. San Diego posted the highest annual rate of decline at 2.9% between 2010 and 2015; however Washington was close behind at 2.7% annually over the eight years from 2006 to 2013.

While a more in-depth analysis of the data is needed to determine specific reasons for each city's success with respect to the others, it should be noted that the top-performing cities in figure 8 have all taken proactive steps to improving energy sustainability.

The highest long-term spike in growth belonged to the city of Riverside between 1990 and 2000, driven primarily by an increase in commercial and industrial sector growth. However the city's trend line also belies limitations in the data. The city's GHG report (Riverside 2010) notes that 1990 data were unavailable and estimated through backcasting based on rate-of-change data between 1998 and 2000. A more intensive analysis that includes more recent data is needed to determine how policy changes in intervening years have impacted the city's trends.

Figure 8 also shows the potential impact of exogenous factors on energy consumption. For example, cities that reported data during the low points of the Great Recession, between 2007 and 2009, namely Minneapolis, Boston, and Portland, saw reductions in their energy use. Other cities whose data bookend the depths of the recession may have also experienced reductions, although they were not captured in the reported data. Extreme weather events, such as below-average winter temperatures and the corresponding increase in heating degree days can have an impact as well. New York's GHG emissions report specifically attributes the 2014 rise in citywide GHG to a very cold winter. Other exogenous economic and population trends also likely have an impact on the trends shown in figure 8.

### Local Government Operations Energy Use

Seventeen cities reported total local government operations energy use for at least one year. Several more cities with GHG inventories reported emissions by sector but did not provide the underlying energy use and are therefore not shown here. Ideally, we would normalize this data by a government-specific indicator, such as government employees or municipal floor space, but this was not widely reported in inventories. To normalize the data, we relied on citywide population. While it is an imperfect indicator, governments are somewhat proportional in size to the population of the constituencies they serve. Also, the year-to-year change in the ratio between these two variables for specific cities is small in most cases, so it is a suitable factor by which to normalize, given the data limitations. The per capita total energy consumption figures we present include energy used for government buildings and public fleets.

Of the 17 cities for which at least one year of data was available, New York, Louisville, and Washington had the highest local government energy consumption per capita, and Denver and Las Vegas had the lowest. As with the citywide energy consumption data, comparisons across cities may be skewed because the most recent inventoried year varies among the cities. For example 2006 and 2005, respectively, are the most recent years for which Louisville and Nashville have inventoried data available, and this information does not reflect recent improvements these cities have made.

Figure 9 displays the local government operations energy consumption per capita from the most recent year inventoried for the 17 cities with available data.

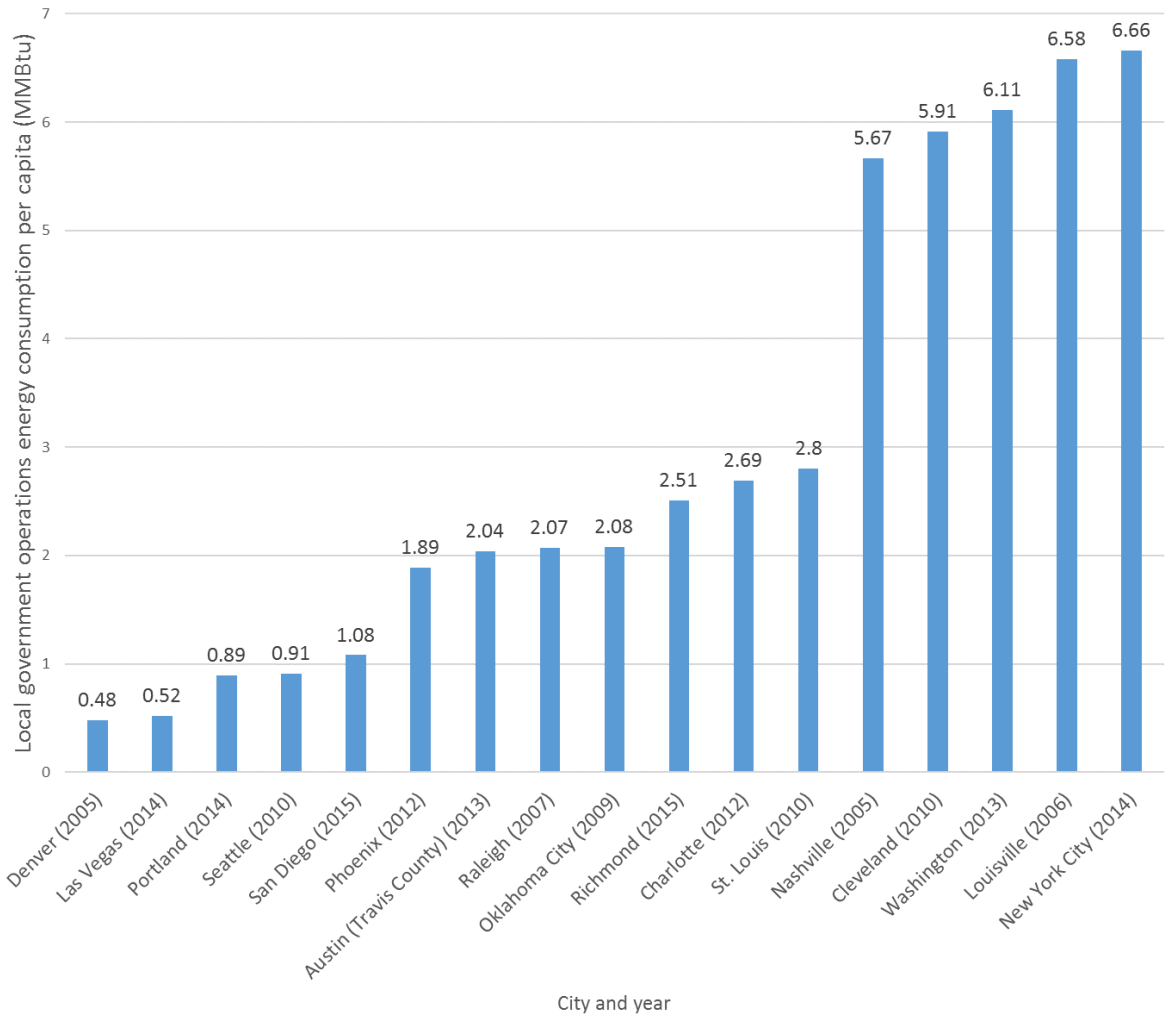


Figure 9. Local government operations energy consumption per capita in most recent year available. See the Methodology section for the assumptions we used in calculations and the limitations of the data. *Sources:* We gathered data on energy use levels in cities from the following GHG inventories and sustainability plans: Ramaswami et al. 2007; Las Vegas 2016; Portland Bureau of Planning and Sustainability, pers. comm., November, 2016; Seattle 2011; EPIC 2016; Walton Sustainability Solutions Initiatives 2013; City of Austin, pers. comm., November 2016; Raleigh 2012; First Environment 2010; City of Richmond, pers. comm., November 2016; Charlotte 2014; St. Louis 2012; Nashville 2009; Cleveland 2013b; District of Columbia 2014a; Louisville Metro Air Pollution Control District 2008; Dickinson, Khan, and Amar 2013.

Figure 10 shows the percentage change in local government operations energy consumption for the eight cities with available data for multiple years.

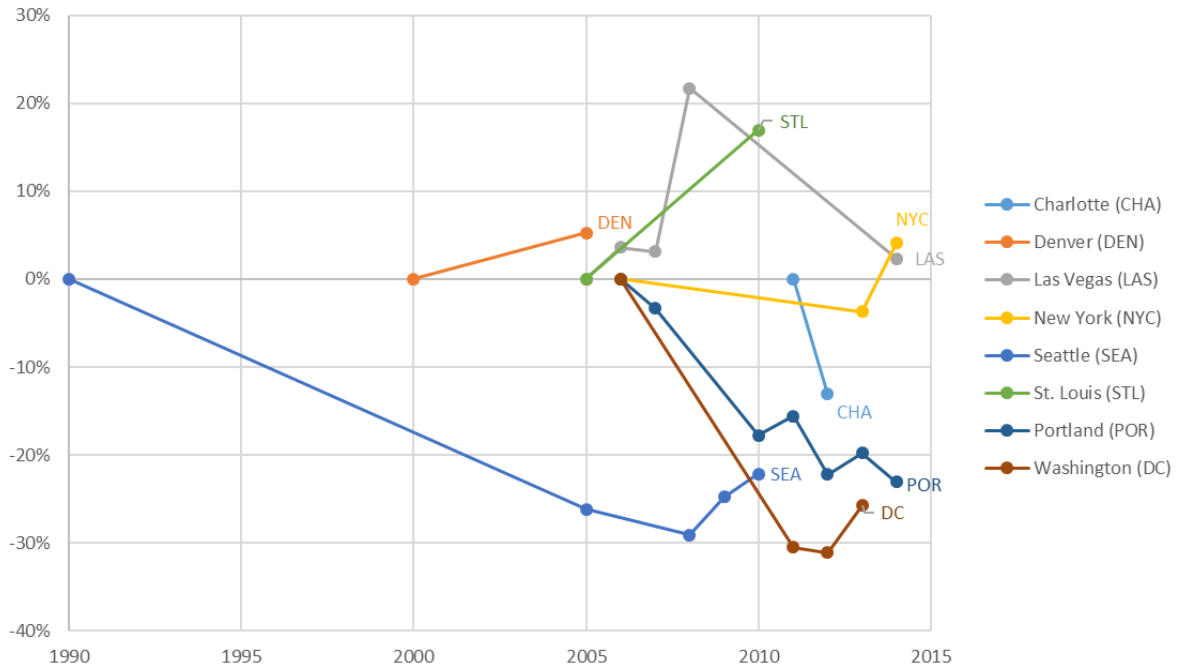


Figure 10. Percentage change in total local government energy consumption per capita. Data shown are changes in total local government operations energy consumption as calculated from data reported in city GHG inventories excluding energy used for airport operations, water delivery and wastewater treatment, streetlights, and employee commutes to work. We calculated all percentage changes from levels in the baseline year. For those cities with more than two years' data, we calculated the percentage changes associated with the third and any subsequent data points from the baseline year rather than the preceding data point.
*Sources:* We calculated the percentage change in energy consumption per capita using data from the following sources: Charlotte 2014, Ramaswami et al. 2007, Las Vegas 2009, Las Vegas 2016, City of New York, Mayor's Office of Sustainability 2016, Papendick 2011, Portland Bureau of Planning and Sustainability, pers. comm., November, 2016, St. Louis 2012; District of Columbia 2014a.

Most notably, Portland and Washington reduced local government energy use per capita by an average of 2.9% and 3.7% per year, respectively. Las Vegas, following a particularly sharp increase in energy use—7.2% from 2005 to 2008—has since seen a pronounced drop in energy use in recent years. This may be evidence of the progress of the city's Sustainable Energy Strategy (Las Vegas 2008), adopted by the city council in 2008. The strategy has spurred energy improvements and retrofits to large swaths of city building space and conversion of tens of thousands of streetlights to LED lamps.

### *RECOMMENDATIONS FOR IMPROVED DATA QUALITY*

The issues we encountered in this analysis illustrate why we score cities based on their energy efficiency policymaking and adoption rather than on specific energy-related outcomes. The data quality is simply not mature enough to evaluate cities' efforts based on outcomes. Action on the following recommendations would allow us to provide a more robust analysis in the future:

- Cities that are not doing so already should begin to track their energy consumption both for the community at large and for local government operations. Monitoring energy consumption is the first step toward increased understanding of energy consumption patterns. This knowledge can be leveraged to inform the policymaking process. Consistent annual tracking of energy consumption is preferable, but biennial or triennial tracking may be sufficient.

- Energy consumption inventories should break down the results by economic sector and end use, particularly for local government energy consumption. Many cities prioritize improved energy management in their own operations before initiating citywide efforts, which suggests that they should also prioritize data collection.

- Cities that already conduct GHG inventories should publish the underlying energy consumption data that they use to estimate emissions.

- Cities should use a clear and transparent data protocol for tracking and reporting community-level energy consumption metrics. The protocol should stipulate the energy units in which to report energy consumption data and the common sector breakdowns for which cities should report usage.

- As consumption inventories are revised and updated, cities should clearly track and document changes to methodologies in order to facilitate an accurate representation of energy use trends and reduce the potential for misleading comparisons of incongruous data sets.

# Chapter 8. Conclusion

Cities around the country continue to show leadership on energy efficiency in transportation, buildings, energy and water utilities, local government operations, and community-wide initiatives. In the process, they are saving households and businesses money, creating jobs, making their communities more resilient, and reducing GHG emissions. Boston continues to be at the forefront, leading the way with strong energy efficiency policies. Others, like New York, Seattle, Los Angeles, and Portland, are also pushing the envelope for more energy savings.

Cities at the very top of the rankings face competition from several cities that have advanced their energy efficiency efforts since we published the *2015 Scorecard*. Los Angeles made a substantial jump and moved into the top five. Los Angeles's exemplary improvements over the last two *Scorecard*s have translated into a 45-point gain since the 2013 report. Los Angeles' improvement is largely due to new energy audit, retrofit, and benchmarking requirements for commercial and residential buildings. San Diego and Phoenix both improved due in part to the adoption of energy savings goals and GHG emission reduction goals. Kansas City improved its score in part because of a newly adopted energy benchmarking requirement.

The most-improved cities' performances should not overshadow many other cities' achievements since the last edition. Thirty-two municipalities improved their scores, and 11 of these, including the four most-improved, boosted their scores by at least 10 points. Just as Los Angeles already has, these cities are poised to emerge as energy efficiency leaders and move up in future *City Scorecard* rankings if they continue to make improvements.

Despite their considerable achievements, all cities—even the top five—have room to expand their efforts. Only 18 cities earned more than half of the available points across the *Scorecard*. Furthermore, while they can improve across all policy areas, cities have the most room for growth in transportation policies. In most policy areas, at least one or two cities earned more than 90% of the available points. In transportation policies, only two cities earned more than 70% of the available points.

A wide gap remains between the cities at the top of the *Scorecard* rankings and those near the bottom. Lower-scoring cities can improve in many areas. The challenge going forward for many communities is to prioritize efficiency activities that will have the greatest impact. We provide general recommendations for improving scores in Chapter 1. Each city will need to develop or refine its own plan for advancing efficiency based on its own needs and priorities.

### *FUTURE EDITIONS*

For future *Scorecard*s, we will continue to review and refine our methodology based on expert and stakeholder comments and new developments in energy efficiency policy and technology. Once again, we will revisit our metrics for energy efficiency–related goals and review various methods for quantifying goal stringency and progress toward goals.

Two sets of metrics are new to this year's *Scorecard*. This is the first edition to recognize energy utility efforts to provide energy efficiency programs to historically underserved

markets. For the next *Scorecard* we will pay particular attention to reevaluating our equity metrics and consider potential improvements or expansions. This edition is also the first to incorporate ICT-related metrics into the scoring methodology. We will continue to monitor the role that ICT can have in accelerating efficiency efforts in cities and will revise methodologies as appropriate to capture these efforts.

We also aim to include additional metrics in future editions. For example, as interest in community resilience continues to grow and potentially begins to drive further energy efficiency activity, we will consider adding resilience metrics to our scoring. We may also add performance-based policy metrics to assess the implementation of select policies we already cover.

Overall, future editions of the *Scorecard* will continue to benchmark cities' energy efficiency progress and serve as a road map for them to strengthen their efforts and bring efficiency to the forefront of local policy action.

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## Appendix A. Methodology and Scoring Updates

We made several improvements to the *2017 City Scorecard* methodology based on comments from reviewers of the 2015 report, and also on an updated analysis of local-level energy consumption, a literature review, and lessons learned from publishing the second edition. We also added new policy and programs elements omitted from past scorecards. Most notably, we added a focus on energy efficiency efforts to reach underserved markets, particularly low-income and multifamily households. We also added metrics to capture the role of information and communications technology (ICT) in reducing energy use.

Table A1 summarizes scoring changes by policy areas and metric categories. We describe improvements to the metrics in the paragraphs that follow.

**Table A1. Scoring by policy areas and their subcategories with changes in scoring methodology**

| Policy area and subcategories | 2017 maximum score | 2015 maximum score | Change in maximum score |
|---|---|---|---|
| Local government operations | 10 | 15 | –5 |
| Local government energy efficiency–related goals | 4.5 | 4 | 0.5 |
| Procurement & construction policies | 3 | 3.5 | –0.5 |
| Asset management | 2.5 | 5 | –2.5 |
| Performance management | 0 | 2.5 | –2.5 |
| Community-wide initiatives | 12 | 10 | 2 |
| Community-wide energy efficiency–related goals | 7.5 | 4 | 3.5 |
| District energy and combined heat and power | 2 | 2.5 | –0.5 |
| Urban heat island mitigation | 2.5 | 1.5 | 1 |
| Performance management | 0 | 2 | –2 |
| Buildings policies | 28 | 29 | –1 |
| Building energy code stringency | 8 | 6 | 2 |
| Building energy code compliance | 6 | 6 | 0 |
| Requirements and incentives for efficient buildings | 8 | 9 | –1 |
| Benchmarking, rating and disclosure | 6 | 6 | 0 |
| Comprehensive efficiency services | 0 | 2 | –2 |
| Energy and water utilities | 20 | 18 | 2 |
| Electric efficiency spending and saving | 6 | 6 | 0 |
| Natural gas efficiency spending and saving | 3 | 3 | 0 |
| Low-income and multifamily programs | 4 | 0 | 4 |
| Energy data provision | 2 | 2 | 0 |
| EE targets and requirements | 0 | 2 | –2 |
| Efficiency efforts in water services | 5 | 5 | 0 |

| Policy area and subcategories | 2017 maximum score | 2015 maximum score | Change in maximum score |
|---|---|---|---|
| Transportation policies | 30 | 28 | 2 |
| Sustainable transportation strategies | 4 | 0 | 4 |
| Location efficiency | 6 | 8 | -2 |
| Mode shift | 6 | 8 | –2 |
| Transit | 5 | 6 | –1 |
| Efficient vehicles | 3 | 3 | 0 |
| Freight system efficiency | 3 | 3 | 0 |
| Affordable housing in transit-oriented developments | 3 | 0 | 3 |

### *LOCAL GOVERNMENT OPERATIONS*

Local government operations had some of the most significant changes. We reduced the number of points from 15 to 10 and removed several metrics, including the performance management category. Cities that regularly release progress reports for their local government goals can still receive credit in the local government energy efficiency goals category. Cities do not receive points for dedicating funding or staff to implement goals. They also no longer receive points for contracting with a third-party firm for evaluation, monitoring, and verification (EM&V) of energy-related programs, or for offering department incentives to staff. We removed these metrics because, while helpful for achieving goals, they are not essential for successful outcomes. Several cities are pursuing these strategies successfully, but many others are not and are still achieving their goals. We also removed metrics assessing cities' infrastructure policies and the transit benefits that local governments offer to their employees.

Beyond removing metrics, we also made revisions to existing metrics and added new ones. The local government energy efficiency goals category now assesses the stringency of energy and climate goals and not just their existence and progress toward achieving them. We also award cities more points for having an energy savings goal as opposed to just a climate goal, because the former is more likely to yield energy savings. In addition, we revised our treatment of city participation in DOE's Better Buildings Challenge (BBC). We previously credited involvement in this effort under comprehensive retrofit strategies, but this year we gave partial credit for it under local government energy efficiency goals.

The procurement and construction policies category now includes a metric recognizing cities with a web-based fleet management portal or software that incorporates GPS technology to increase fleet efficiency. This metric replaces one for anti-idling policies and driving behavior. We chose to remove this latter metric because research linking anti-idling policies to fuel reductions is scarce.

We also broadened our treatment of LEED policies for municipal buildings. We previously gave credit only for municipal LEED requirements that emphasized energy efficiency. Now, in the light of recent research and an updated version of LEED that emphasizes energy performance, we credit all municipal LEED Silver, Gold, and Platinum requirements.

### *COMMUNITY-WIDE INITIATIVES*

Many of the changes in our community-wide initiatives scoring mirror changes in local government operations. We removed the performance management category and reallocated its points. We also increased the points for community-wide goals to recognize cities who have adopted both energy-saving and climate goals. As in local government operations, the community-wide energy efficiency goals category now assesses the stringency of goals. We also changed the efficient distributed energy systems metric to focus on future planning for distributed systems as opposed to current CHP capacity.

### *BUILDINGS POLICIES*

We changed the scoring for the building energy code stringency category to account for the new 2015 IECC and ASHRAE 2013 codes. We also removed a metric analyzing city spending on building code compliance and replaced it with one that assesses city staffing for energy code compliance. Cities report their code compliance budgets in various formats, making comparisons of spending among cities less reliable. We also amended the scoring for the benchmarking and transparency policy category. In the past, cities without authority to enact these policies received 0 points. This year we developed an alternative scoring track for those cities and awarded them points for running benchmarking programs. We no longer score cities on the availability of comprehensive energy efficiency services or on having an energy savings goal. We account for this goal in community-wide initiatives.

### *ENERGY AND WATER UTILITIES*

We increased the number of available points from 18 to 20. We added a city-utility formal partnership metric and removed the metric for city-utility coordination on particular efficiency programs. To reflect increased spending and savings by gas utilities over the last few years, we increased the maximum gas efficiency spending threshold from $35 to $50 and maximum gas savings from 1% to 1.2%. We also put greater emphasis on savings from energy efficiency programs, both electric and natural gas, rather than spending on programs. We removed the metric on energy efficiency targets and funding agreements, and added one for low-income and multifamily efficiency programs. In the water section, we altered the metric on water efficiency program funding to refocus on jointly provided energy-water programs. Finally, we combined our previous stormwater and green infrastructure metrics into a single score for green infrastructure plans.

### *TRANSPORTATION POLICIES*

We made several changes related to transportation policies. We added a new metric for requirements or incentives encouraging the creation of affordable housing in transit-served areas. The focus of the freight category changed. Previously, we assessed cities based on the number of efficient intermodal freight facilities within their borders. Since cities may not be able to influence the construction of these facilities, we changed the scoring to assess freight-related activities over which they have more control. Cities earned points for having a plan to increase freight efficiency or for using an Internet application or service to help coordinate freight transportation.

We also made changes to the following categories: sustainable transportation strategies, location efficiency, and mode shift. For the most part, we reorganized these metrics and did

not add scoring for new topic areas. Cities now earn separate points for having goals for VMT reduction and modal shift, whereas before they earned credit for one or the other, even if they had both. Finally, cities no longer receive points for anti-idling policies or transportation partnerships.

# Appendix B. Data Request Respondents

Table B1. Cities' data request respondents

| City | Primary local government data request respondent | Electric utility data request respondent | Natural gas utility data request respondent |
|---|---|---|---|
| Atlanta | Jairo Garcia, Director, Climate Policies and Renewables, Mayor's Office of Sustainability | Jeff Smith, Energy Efficiency Strategy and Implementation Manager, Georgia Power | — |
| Austin | Cavan Merski, Senior Business Systems Analyst, Office of Sustainability | Cavan Merski, Senior Business Systems Analyst, Office of Sustainability | — |
| Baltimore | Anne Draddy, Sustainability Coordinator, Office of Sustainability | Sheldon Switzer, Manager of Measurement and Verification, BGE | BGE also provides natural gas service to Baltimore. |
| Birmingham | — | — | — |
| Boston | Adam Jacobs, Energy Manager | James Cater, Renew Boston Utility Program Liaison, Eversource | Melanie Coen, Senior Analyst, National Grid |
| Charlotte | Erika Ruane, Sustainability Coordinator | Daniel Maddox, Senior Program Performance Analyst, Duke Energy | — |
| Chicago | Amy Jewel, Senior City Advisor, City Energy Project Chicago | Rebecca McNish, Energy Efficiency Analyst, ComEd | Patrick Michalkiewicz, Manager, Energy Efficiency and Major Accounts, Peoples Gas |
| Cincinnati | Rob McCracken, Project Development Manager, Greater Cincinnati Energy Alliance | Daniel Maddox, Program Performance Analyst, Duke Energy | Duke Energy Ohio also provides natural gas service to Cincinnati. |
| Cleveland | Anand Natarajan, Energy Manager, Mayor's Office of Sustainability | — | Saskia Topazio, Regulatory Analyst, Dominion East Ohio |
| Columbus | Willie Overman, Energy Manager | — | Sarah Poe, Team Leader, Evaluation Demand Side Management, Columbia Gas of Ohio |
| Dallas | — | Bruce Blackburn, Senior Program Manager, Oncor | Christopher Felan, Vice President of Regulatory Affairs, ATMOS Energy |
| Denver | Katrina Managan, Senior Advisor, Department of Environmental Health | Michael Pascucci, Senior Regulatory Analyst, Xcel Energy | Xcel also provides natural gas service to Denver. |
| Detroit | — | Jason Kupser, Principal Supervisor, Marketing, DTE Energy | DTE also provides Detroit with natural gas service. |

| City | Primary local government data request respondent | Electric utility data request respondent | Natural gas utility data request respondent |
|---|---|---|---|
| El Paso | ___ | Susanne Stone, Manager, Energy Efficiency, El Paso Electric | — |
| Fort Worth | Dana Burghdoff, Assistant Director, Planning | Bruce Blackburn, Senior Program Manager, Oncor | Christopher Felan, Vice President of Regulatory Affairs, ATMOS Energy |
| Hartford | — | — | Brian Sullivan, Principal Analyst, Connecticut Natural Gas |
| Houston | Lisa Lin, Sustainability Manager, Office of the Mayor | Calvin Burnham, Staff Consulting Engineer, Energy Efficiency Programs, CenterPoint Energy | CenterPoint Energy also provides Houston with natural gas service. |
| Indianapolis | Jeffrey Meek, Project Manager, Office of Sustainability | Jake Allen, DSM Program Development Manager, Indianapolis Power and Light | Brett McClellan, Energy Efficiency Program Coordinator, Citizens Energy Group |
| Jacksonville | Nicholas Zelaya, Finance Coordinator, Public Works Department | Donald Wucker, DSM Portfolio Management, JEA | — |
| Kansas City | Jerry Shechter, Sustainability Coordinator, Office of the City Manager, Office of Environmental Quality | — | Shaylyn Dean, Energy Efficiency Program Specialist, Missouri Gas Energy |
| Las Vegas | Marco N. Velotta, Office of the City Manager, Administration Office of Sustainability | — | Brooks Congdon, Manager, Energy Efficiency, Southwest Gas |
| Los Angeles | Hilary Firestone, Senior Project Manager, Energy Efficiency, Budget and Innovation Team, Office of the Mayor | Gretchen Hardison, Environmental Affairs Officer, LADWP | Darren Hanway, EE Operations Manager, Southern California Gas |
| Louisville | Andrea M. Webster, Project Coordinator, Office of Sustainability | — | — |
| Memphis | Vivian Ekstrom, Planner, Sustainability Office | Mike Villanueva, Strategic Marketing Coordinator, MLGW | MLGW also provides Memphis with natural gas service. |
| Miami | — | — | — |

| City | Primary local government data request respondent | Electric utility data request respondent | Natural gas utility data request respondent |
|---|---|---|---|
| Milwaukee | Erick Shambarger, Director, Office of Environmental Sustainability | Ben Dickson, Director of Performance Management, Focus on Energy<br>Brian Lambert, Manager, Customer Programs and Customer Experience Operations, We Energies | Focus on Energy also administers natural gas efficiency programs to Milwaukee. |
| Minneapolis | Luke Hollenkamp, Sustainability Program Coordinator | Chris Barthol, Senior Regulatory Analyst, Xcel Energy | Nick Mark, Manager, Conservation and Renewable Energy Policy, CenterPoint Energy |
| Nashville | Laurel Creech, Chief Service Officer, Mayor's Office of Environment and Sustainability | — | — |
| New Orleans | Siohan Foley, Executive Fellow for Climate Action, Mayor's Office of Resilience and Sustainability [a] | — | — |
| New York | Stacy Lee, Senior Policy Advisor, Office of Sustainability | Michael Harrington, Section Manager, Market Research and Analytics, Energy Efficiency and Demand Management, Consolidated Edison<br>Allyson Burns, Program Manager, Reporting and Quality Assurance, NYSERDA | Joseph Dolengo, National Grid<br>Allyson Burns, Program Manager, Reporting and Quality Assurance, NYSERDA |
| Oklahoma City | T. O. Bowman, Office of Sustainability | ------ | Teri Green, EE Program Manager, Oklahoma Natural Gas Company |
| Orlando | Brittany Sellers, Contractor Associate, Office of Sustainability & Energy | Kevin Burns, Conservation Manager, Orlando Utilities Commission | — |
| Philadelphia | Richard Freeh, City Energy Project Manager, Office of Sustainability | Maria Mancuso, Senior Business Analyst, Exelon PECO | Jonathan David, Director, Customer Programs, Philadelphia Gas Works |
| Phoenix | Dimitrios Laloudakis, Energy Manager, Office of Sustainability | Roger Krouse, Senior Account Executive, Arizona Public Service | Brooks Congdon, Manager, Energy Efficiency, Southwest Gas |
| Pittsburgh | Aftyn Giles, Sustainability Coordinator, Office of the Mayor | — | Lisa Reilly, Director, Billing and Meter Reading, Peoples Natural Gas Company |

| City | Primary local government data request respondent | Electric utility data request respondent | Natural gas utility data request respondent |
|---|---|---|---|
| Portland | Michael Armstrong, Senior Sustainability Manager, Bureau of Planning and Sustainability | Andrew Hudson, Planning Project Manager, Energy Trust of Oregon | Energy Trust of Oregon also administers natural gas efficiency programs to Portland. |
| Providence | Dino Larson, Energy Manager, Office of Sustainability | Stefan Nagy, Senior Analyst, National Grid (Narragansett) | National Grid (Narragansett) also administers natural gas efficiency programs to Providence. |
| Raleigh | Cindy Holmes, Assistant Sustainability Manager, Office of Sustainability | Daniel Maddox, Senior Program Performance Analyst, Duke Energy | — |
| Richmond | Tom Phan, Management Analyst II, Sustainability Office | Michael Kearns, Energy Services Manager, Richmond Department of Public Utilities | — |
| Riverside | Andrew Markis, Sustainability Officer and Principal Account Manager, Riverside Public Utilities | — | — |
| Sacramento | — | — | Sean Mackay, Energy Efficiency Policy, PG&E |
| Salt Lake City | Peter Nelson, Sustainability Coordinator, Division of Sustainability and the Environment | Michael Snow, Manager, DSM Regulatory Affairs, PacifiCorp | — |
| San Antonio | Liza Meyer, Special Projects Manager, Office of Sustainability [b] | Touseef Mohammed, Program Manager, CPS Energy | CPS also provides San Antonio with natural gas service. |
| San Diego | Aaron Lu, Program Coordinator, Environmental Services Department | Athena Besa, Senior Project Manager, San Diego Gas and Electric | San Diego Gas and Electric also provides San Diego with natural gas service. |
| San Francisco | — | Sean Mackay, Energy Efficiency Policy, PG&E | PG&E also provides San Francisco with natural gas service. |
| San Jose | Ken Davies, Manager, Sustainability and Compliance | Sean Mackay, Energy Efficiency Policy, PG&E | PG&E also provides San Jose with natural gas service. |
| Seattle | Christie Baumel, Energy Policy Advisor, Office of Sustainability and Environment | Brendan O'Donnell, Energy Planning Supervisor, Conservation Resources Division, Seattle City Light | Jim Perich-Anderson, Senior Market Analyst, Puget Sound Energy |

| City | Primary local government data request respondent | Electric utility data request respondent | Natural gas utility data request respondent |
|---|---|---|---|
| St. Louis | Catherine Werner, Sustainability Director, City of St. Louis Mayor's Office [b] | Jeff Brueggemann, Program Specialist, Ameren Missouri | Jim Travis, Energy Efficiency Program Specialist, Laclede Gas Company |
| Tampa | Thomas Snelling, Director, Planning and Development | Erika Perez, Regulatory Rate Analyst, TECO | TECO also provides Tampa with natural gas service. |
| Virginia Beach | Lori J. Herrick, Energy Management Administrator | — | Tyler Lake, Manager, State Regulatory Affairs, Virginia Natural Gas |
| Washington | Marshall Duer-Balkind, Program Analyst, Department of Energy & Environment [a] | Rebecca Gordon, Senior Business Analyst, Pepco Holdings, Inc.<br>Benjamin Plotzker, Technical Energy Analyst, Vermont Energy Investment Corporation, for DCSEU | DCSEU also administers natural gas efficiency programs to Washington. |

[a] Contact submitted data during external review period. [b] Contact did not complete data request but submitted brief comments in response to external review draft.

# Appendix C. Additional Tables on Policies, Results, and Energy Performance

**Table C1. Scoring on energy-related goals for local government operations**

| City | Local govt operations energy goal [a] | Local govt operations climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal [b] | Progress: projected reduction in target year [c] |
|---|---|---|---|---|---|---|
| Atlanta[1] | 20% energy use reduction by 2020 from 2009 baseline | 20% emissions reduction by 2020 from 2009 levels | • | GHG | 1.8% | Data not available |
| Austin[2] | None | 100% GHG emissions reduction by 2020 from 2007 baseline | • | GHG | 7.7% | Data not available |
| Baltimore[3] | 30% energy use reduction by 2022 from 2006 baseline | 15% GHG emissions reduction by 2020 from 2007 baseline | • | Energy | 3.2% | 13.3% |
| Birmingham | None | None | • | N/A | N/A | N/A |
| Boston[4] | 20% energy use reduction by 2017 | 25% GHG emissions reduction by 2020 from 2005 baseline | • | GHG | 1.3% | 53.2% |
| Charlotte[5] | Use 15% less energy as compared to facilities across the southeastern US | None | | N/A | N/A | Data not available |
| Chicago[6] | 10% increase in energy efficiency by 2017 (for municipal buildings) from 2010 | 25% GHG emissions reduction community-wide by 2020 (including government operations) from 1990 baseline | • | GHG | 0.8% | Data not available |
| Cincinnati | None | 2% annual GHG emissions reduction between 2013 and 2020 | • | GHG | 2.0% | Data not available |

| City | Local govt operations energy goal [a] | Local govt operations climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal [b] | Progress: projected reduction in target year [c] |
|---|---|---|---|---|---|---|
| Cleveland[7] | 10% energy use reduction by 2020 from 2010 baseline | 20% GHG emissions reduction by 2020 from 2010 baseline | | GHG | 2.0% | Data not available |
| Columbus[8] | None | 30% GHG emissions reduction by 2020 from 2005 baseline | • | GHG | 1.4% | 42.3% |
| Dallas[9] | None | 39% GHG emissions reduction by 2017 from 1990 baseline | • | GHG | 1.8% | 95.3% |
| Denver[10] | 20% energy use reduction by 2020 from 2012 baseline | 6% GHG emissions reduction by 2020 from 2011 baseline | • | Energy | 3.7% | 6.9% |
| Detroit | None | None | | N/A | N/A | N/A |
| El Paso[11] | 20% reduction in portfolio energy intensity by 2020 from 2009 baseline | None | • | N/A | N/A | N/A |
| Fort Worth[12] | 20% reduction in portfolio energy intensity by 2020 from 2009 baseline | None | • | N/A | N/A | N/A |
| Hartford[13] | City's Clean Energy Taskforce is developing an energy reduction plan that will include local government goals. | None | | N/A | N/A | N/A |
| Houston[14] | 20% reduction in portfolio energy intensity by 2021 from 2008 baseline | None | • | N/A | N/A | N/A |
| Indianapolis | None | None | | N/A | N/A | N/A |

| City | Local govt operations energy goal [a] | Local govt operations climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal [b] | Progress: projected reduction in target year [c] |
|---|---|---|---|---|---|---|
| Jacksonville | None | None | | N/A | N/A | N/A |
| Kansas City[15] | None | 30% GHG emissions reduction by 2020 from 2000 baseline | • | GHG | 1.8% | 38.8% |
| Las Vegas[16] | None | 20% GHG emissions reduction by 2020 from 2008 baseline | • | GHG | 1.7% | 57.3% |
| Los Angeles[17] | 18% energy use reduction by 2025 from 2013 baseline | 35% GHG emissions reduction by 2025 from 2008 baseline | • | Energy | 1.5% | Data not available |
| Louisville[18] | 30% energy use reduction by 2018 from 2010 baseline | None | • | Energy | 7.2% | 16.9% |
| Memphis | None | None | | N/A | N/A | N/A |
| Miami | None | None | | N/A | N/A | N/A |
| Milwaukee[19] | 20% reduction in portfolio energy intensity by 2022 from 2009 baseline | None | • | N/A | N/A | N/A |
| Minneapolis[20] | None | 1.5% annual GHG emissions reduction | • | GHG | 1.5% | 3.2% |
| Nashville | None | 20% GHG emissions reduction by 2020 from 2005 baseline | • | GHG | 1.9% | 0% |
| New Orleans | Energy target under development | None | | N/A | N/A | N/A |
| New York[21] | 30% energy use reduction by 2017 from 2006 baseline | 35% GHG emissions reduction by 2025 from 2006 baseline | • | GHG | 1.5% | 100% |

| City | Local govt operations energy goal [a] | Local govt operations climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal [b] | Progress: projected reduction in target year [c] |
|---|---|---|---|---|---|---|
| Oklahoma City | Energy target under development | None | | N/A | N/A | N/A |
| Orlando[22] | 10% energy use reduction by 2017 from 2010 baseline | 15% GHG emissions reduction by 2017 from 2010 baseline | • | Energy | 2.1% | Data not available |
| Philadelphia[23] | 30% energy use reduction by 2015 from 2008 baseline | 20% GHG emissions reduction by 2015 from 2008 baseline | • | GHG | 3.0% | 100% |
| Phoenix[24] | 20% energy use reduction by 2020 from 2005 baseline | 40% GHG emissions reduction by 2025 from 2005 baseline | • | GHG | 2.9% | 25.7% |
| Pittsburgh[25] | 50% energy use reduction by 2030 from 2013 baseline | 20% GHG emissions reduction community-wide by 2023 (including government operations) from 2003 baseline | • | Energy | 2.9% | Data not available |
| Portland[26] | 2% annual energy use reduction from city and county government operations | 53% GHG emissions reduction in city and county government operations by 2030 from FY 2006–07 baseline | • | Energy | 2.0% | 2.7% |
| Providence[27] | 30% energy use reduction by 2030 from 2010 baseline | 10% GHG emissions reduction community-wide by 2025 (including municipal buildings) from 1990 baseline | • | Energy | 2.3% | 0% |
| Raleigh | None | None | | N/A | N/A | N/A |
| Richmond[28] | 1% annual energy use reduction from 2008 baseline | 80% GHG emissions reduction community-wide by 2050 (including municipal buildings) from 2008 baseline | • | GHG | 2.1% | 71.8% |

| City | Local govt operations energy goal [a] | Local govt operations climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal [b] | Progress: projected reduction in target year [c] |
|---|---|---|---|---|---|---|
| Riverside[29] | None | 15% GHG emissions reduction by 2020 from 2007 baseline | • | GHG | 1.2% | Data not available |
| Sacramento[30] | 25% energy use reduction by 2030 from 2005 baseline | 22% GHG emissions reduction by 2020 from 2005 baseline | • | GHG | 0.02% | 77.5% |
| Salt Lake City[31] | 20% reduction in portfolio energy intensity by 2025 from 2012 baseline | None | • | N/A | N/A | N/A |
| San Antonio | None | None | | N/A | N/A | N/A |
| San Diego[32] | 15% energy use reduction by 2020 from 2010 baseline | 15% GHG emissions reduction by 2020 from 2010 baseline | • | Energy | 2.0% | 11.6% |
| San Francisco[33] | None | 25% GHG emissions reduction by 2017 from 1990 baseline | • | GHG | 0.9% | Data not available |
| San Jose[34] | 15% energy use reduction by 2018 (including municipal buildings) from 2008 baseline | None | • | Energy | 1.5% | Data not available |
| Seattle[35] | 20% energy use reduction by 2020 from 2008 | None | • | Energy | 1.7% | 3.4% |
| St. Louis | None | GHG target under development | | N/A | N/A | N/A |
| Tampa | None | None | | N/A | N/A | N/A |

| City | Local govt operations energy goal [a] | Local govt operations climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal [b] | Progress: projected reduction in target year [c] |
|---|---|---|---|---|---|---|
| Virginia Beach[36] | 5% energy use reduction by 2020 from 2015 (1% annually) | None | • | Energy | 0.3% | 20% |
| Washington[37] | 50% energy use reduction community-wide by 2032 (including municipal buildings) from 2012 baseline | 50% GHG emissions reduction community-wide by 2032 (including municipal buildings) from 2006 baseline | • | GHG | 1.8% | 100% |

[a] We did not score cities with energy goals for only a portion of municipal buildings for the stringency or progress metrics as these cities were not comparable to those that have adopted goals for all municipal buildings. [b] We awarded points for stringency to cities with both energy efficiency and climate goals based upon the goal with the most stringent near-term annual target or the goal for which data were available. Unless otherwise noted, we converted the difference between a city's energy use or emissions levels for the year closest to that in which the goal was adopted and the nearest-term targeted goal into an average annual percentage energy savings or emissions reduction. [c] We projected the result of continuing the most recent rate of annual energy savings or emissions reductions until the goal's nearest-term target year to quantify the projected savings or reduction. We gave a city partial credit for being on track for its goal if it was projected to achieve a level of savings within 25% of its stated goal. We measured this as a 25% variation from a city's stated goal. For example, if a city aimed to reduce emissions by 40% and was projected to achieve a 30% reduction, it earned points because it was within 25% of its stated target. *Sources:* We gathered local government goals and data to project energy savings or GHG emissions reduction levels in target years from the following sustainability plans, climate action plans, GHG inventories, and other city-provided documentation. [1] We were unable to find GHG data for the baseline year of Atlanta's GHG target. We calculated the stringency of its goal by dividing the targeted percent reduction by the number of years between the city's baseline year and nearest-term target year. Data request. [2] We were unable to find GHG data for the baseline year of Austin's GHG target. We calculated the stringency of its goal by dividing the targeted percent reduction by the number of years between the city's baseline year and nearest-term target year. Austin 2015. [3] Baltimore 2015; data request. [4] Under the Massachusetts Green Communities Program, the original end date for Boston's municipal energy savings goal was 2014; however the city is still working to meet this target. Boston 2014a. [5] Charlotte is in the process of finalizing its updated Focus Area Plan, which includes a 15% energy savings target for city facilities relative to energy consumption of facilities across the Southeast. Due to the format of this target, we are unable to score on stringency. Data request. [6] Chicago is still working toward energy savings target included in Sustainable Chicago 2015 and will continue to do so until the next Sustainable Chicago plan is in place. We are crediting this target because the city is still actively working toward it. We were unable to find GHG data for the baseline year of Chicago's GHG target. We calculated the stringency of its goal by dividing the targeted percent reduction by the number of years between the city's baseline year and nearest-term target year. [7] We were unable to find GHG data for the baseline year of Cleveland's GHG target. We calculated the stringency of its goal by dividing the targeted percent reduction by the number of years between the city's baseline year and nearest-term target year. Cleveland 2013b. [8] Columbus 2015. [9] Dallas 2009; Dallas 2012a; Dallas 2014. [10] Denver 2017; data request. [11] El Paso receives credit for the existence of their municipal energy savings goal under DOE's Better Buildings Challenge. DOE 2017a. [12] Fort Worth receives credit for the existence of their municipal energy savings goal under DOE's Better Buildings Challenge. DOE 2017a. [13] Data request. [14] Houston receives credit for the existence of their municipal energy savings goal under DOE's Better Buildings Challenge. DOE 2017a. [15] Kansas City 2015. [16] Las Vegas 2016; CDP 2016. [17] We were unable to find energy data for the baseline year of Los Angeles's energy target. We calculated the stringency of its goal by dividing the targeted percent reduction by the number of years between the city's baseline year and nearest-term target year. Los Angeles 2015b. [18] Louisville 2016. [19] Milwaukee receives credit for the existence of its municipal energy savings goal under DOE's Better Buildings Challenge. DOE 2017a. [20] Because Minneapolis's GHG target is annual, we project GHG reductions in terms of annual savings. Minneapolis 2012; Minneapolis 2016. [21] Dickinson, Khan, and Amar 2013; Pasion, Amar, and Zhou 2016. [22] We were unable to find GHG data for the baseline year of Orlando's GHG target. We calculated the stringency of its

goal by dividing the targeted percent reduction by the number of years between the city's baseline year and nearest-term target year. [23] Philadelphia's municipal energy savings goal originally had an end date of 2015; however the city is still working toward this goal and is in the process of setting new energy and GHG targets. We scored the city based on the stringency of its recent GHG goal and its success in achieving this target. We found that Philadelphia did not achieve its local government energy savings goal that ended in 2015. Philadelphia 2016a. [24] Phoenix 2013a; Phoenix 2016a. [25] We were unable to find GHG data for the baseline year of Pittsburgh's energy target. We calculated the stringency of its goal by dividing the targeted percent reduction by the number of years between the city's baseline year and nearest-term target year. Pittsburgh 2012a. [26] Because Portland's energy savings target is annual, we project energy savings in terms of annual savings. Data request. [27] Providence 2016b. [28] Richmond 2014. [29] Riverside 2016b. [30] Sacramento 2015. Sacramento 2016a. [31] Salt Lake City receives credit for the existence of their municipal energy savings goal under DOE's Better Buildings Challenge. DOE 2017a. [32] San Diego 2016a. [33] We were unable to find GHG data for the baseline year of San Francisco's GHG target. We calculated the stringency of its goal by dividing the targeted percent reduction by the number of years between the city's baseline year and nearest-term target year. ICF International 2015; San Francisco 2013a. [34] San Jose 2016c. [35] Personal communication with Christie Baumel. [36] Virginia Beach 2016b. [37] District of Columbia 2014a.

Table C2. City scoring on community-wide energy-related goals

| City | Community energy goal[a] | Formally adopted | Community climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal[b] | Progress: projected reduction in target year[c] |
|---|---|---|---|---|---|---|---|
| Atlanta[1] | Reduce energy consumption in commercial and residential buildings 20% by 2020 and 40% by 2030 using 2009 baseline | • | Reduce GHG emissions 20% by 2020 and 40% by 2030 using 2009 baseline | • | Climate | 1.5% | 43% |
| Austin[2] | Reduce 20% of GHG emissions from the city's electric utility from 2005 levels by 2020 | • | Reduce GHG emissions by 25% below 2010 baseline by 2020, 49% by 2030, 70% by 2040, and 100% by 2050 | • | Climate | 2.4% | 33% |
| Baltimore[3] | Reduce energy consumption by all buildings 13% below 2010 baseline by 2020 | • | educe GHG emissions 15% below 2010 baseline by 2020 | • | Climate | 1.5% | N/A |
| Birmingham | None | | None | | | N/A | N/A |

| City | Community energy goal[a] | Formally adopted | Community climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal[b] | Progress: projected reduction in target year[c] |
|---|---|---|---|---|---|---|---|
| Boston[4] | Reduce energy consumption in all commercial and industrial buildings by 7% | • | Reduce GHG emissions by 25% below 2005 baseline in 2020 and 80% by 2050 | • | Climate | 1.9% | 36% |
| Charlotte | None | | None | | | N/A | N/A |
| Chicago[5] | Reduce energy use by 30% in residential buildings by 2020 | | Reduce GHG emissions 25% below 1990 baseline by 2025 and 80% by 2050 | • | Climate | 1.8% | 22% |
| Cincinnati[6] | None | | Reduce GHG emission 24% below 2006 baseline by 2020 | • | Climate | 2.5% | 16% |
| Cleveland[7] | Reduce residential and commercial energy use 50% and industrial energy use 30% below 2010 baseline | | Reduce GHG emissions 16% below 2010 baseline by 2020, 40% by 2030, and 80% by 2050 | | Climate | 1.6% | N/A |
| Columbus[8] | Reduce energy consumption 20% by 2020 below 2013 baseline | • | Reduce GHG emissions 20% below 2013 baseline | • | Climate | 4.7% | 24% |
| Dallas[9] | The city has an established 2030 District. | | The city has set goals for reducing GHG emissions for individual community sectors. These goals have not been formally adopted for community-wide implementation. | | | N/A | N/A |

| City | Community energy goal[a] | Formally adopted | Community climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal[b] | Progress: projected reduction in target year[c] |
|---|---|---|---|---|---|---|---|
| Denver[10] | Reduce energy consumption of commercial and multifamily buildings 10% below 2012 baseline by 2020 and 20% in the decade following | • | Reduce GHG emissions below 1990 levels by 2020, a 9.2% reduction below 2013 levels when the goal was adopted | • | Climate | 1.3% | 6% |
| Detroit | None | | None | | | N/A | N/A |
| El Paso | None | | None | | | N/A | N/A |
| Fort Worth[11] | The city participates in the DOE's Better Buildings Challenge with a goal to improve energy efficiency by 20% in specific buildings by the year 2020. | | None | | | N/A | N/A |
| Hartford | None | | None | | | N/A | N/A |
| Houston[12] | The city participates in the DOE's Better Buildings Challenge with a goal to improve energy efficiency by 20% in specific buildings by 2020. | | At the Mayors' National Climate Action Agenda, Mayor Parker committed the city to an 80% reduction of 2005 GHG emissions levels by 2050. The city is in the process of developing a formal sustainability action plan. | | | N/A | N/A |
| Indianapolis | None | | None | | | N/A | N/A |
| Jacksonville | None | | None | | | N/A | N/A |

| City | Community energy goal[a] | Formally adopted | Community climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal[b] | Progress: projected reduction in target year[c] |
|---|---|---|---|---|---|---|---|
| Kansas City[13] | Reduce energy use 20% by 2015 and 50% by 2050 below 2000 baseline | • | Reduce GHG emissions 30% below 2000 baseline by 2020 and 80% by 2050 | • | Climate | 1.6% | 16% |
| Las Vegas | None | | None | | | N/A | N/A |
| Los Angeles[14] | Reduce energy use per square foot for all buildings below 2013 baseline by at least 14% in 2025 and 30% in 2035; use energy efficiency to deliver 15% of all the city's projected electricity needs by 2020 through rebates, incentives, and education | • | Reduce GHG emissions below 1990 baseline by at least 45% in 2025, 60% in 2035, and 80% in 2050; improve GHG efficiency of Los Angeles economy from 2009 levels by at least 55% in 2025 and 75% in 2035 | • | Climate | 2.6% | 100% |
| Louisville[15] | Reduce energy use per capita 25% by 2025 from 2010 baseline | • | Mayor Greg Fischer signed the Compact of Mayors in April 2016. A GHG emissions reduction goal has not been set, but will be as required by the compact. | | Energy | 2.0% | 15% |

| City | Community energy goal[a] | Formally adopted | Community climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal[b] | Progress: projected reduction in target year[c] |
|---|---|---|---|---|---|---|---|
| Memphis | Some in Memphis and Shelby County endorsed a community-driven goal of creating 800 MW of energy savings by 2020, but the city has not yet identified or implemented a community-wide energy efficiency-related target. | | In 2015, the city committed to the Compact of Mayors and is currently completing an inventory of community-wide GHG emissions. As part of complying with the compact, the city will set reduction targets for GHG emissions and complete a climate action plan by 2018. | | | N/A | N/A |
| Miami[17] | Reduce per capita non-renewable residential energy use to 20% below 2007 baseline by 2015 | | Reduce GHG emissions 25% below 2007 baseline by 2020 | • | Climate | 1.8% | N/A |
| Milwaukee[18] | The city adopted the DOE's Better Buildings Challenge goal of improving energy efficiency by 20% in commercial buildings by 2020. | • | None | | | N/A | N/A |
| Minneapolis[19] | Reduce energy use 17% below an expected growth baseline by 2025; achieve 15% energy efficiency in residential buildings and 20% energy efficiency in commercial and industrial buildings below the growth baseline by 2025 | • | Reduce GHG emissions 30% under 2006 levels by 2025 and 80% under 2006 levels by 2050 | • | Climate | 2.0% | 41% |

| City | Community energy goal[a] | Formally adopted | Community climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal[b] | Progress: projected reduction in target year[c] |
|---|---|---|---|---|---|---|---|
| Nashville[20] | None | | The Mayor's Livable Nashville committee will set GHG emissions goals based on a community and municipal inventory currently being conducted. | | | N/A | N/A |
| New Orleans[21] | The city has set a goal for Entergy New Orleans, the utility serving the city, to increase annual energy savings by 0.2% annually through 2017. | • | New Orleans has committed to the Compact of Mayors and aims to complete a climate action plan with climate and energy efficiency goals by 2018. The city has already completed a GHG inventory. | | Energy | 0.2% | 47% |
| New York[22] | None | | Reduce GHG emissions for all private-sector buildings by 30% from a 2005 baseline by 2025. These reductions contribute to a larger, citywide emissions target of an 80% reduction from the 2005 baseline by 2050. | • | Climate | 2.1% | 25% |

| City | Community energy goal[a] | Formally adopted | Community climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal[b] | Progress: projected reduction in target year[c] |
|---|---|---|---|---|---|---|---|
| Oklahoma City[23] | The Sustainability Office has engaged a group of stakeholders to create a sustainability plan that is expected to include an efficiency goal when adopted in 2017. | | None | | | N/A | N/A |
| Orlando[24] | Reduce electricity consumption 5% below 2010 levels by 2018 and 25% below 2010 levels by 2040 | • | Reduce GHG emissions 25% below 2007 levels by 2018 and 90% below 2007 levels by 2040 | • | Climate | 2.3% | N/A |
| Philadelphia[25] | The city is undergoing an energy master planning process to set new, data-driven community energy targets, and expects to complete the process in 2017. | • | Reduce GHG emissions 80% by 2050 below 2006 baseline | • | Climate | 2.1% | 85% |
| Phoenix[26] | Adopted a goal to have all new buildings net positive in terms of both energy and materials by 2050 | • | Become a carbon-neutral city by 2060; currently conducting a GHG inventory | • | Climate | 2.4% | N/A |
| Pittsburgh[27] | The city is in the process of creating a climate action plan with a community-wide goal for reducing energy use. | | Reduce GHG emissions by 20% below 2003 levels by 2023 | • | Climate | 1.2% | 100% |

| City | Community energy goal[a] | Formally adopted | Community climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal[b] | Progress: projected reduction in target year[c] |
|---|---|---|---|---|---|---|---|
| Portland[28] | Reduce total energy use in all buildings built before 2010 by 25% below 2009 levels by 2030 | • | Reduce emissions 80% below 1990 levels by 2050 | • | Climate | 1.9% | 100% |
| Providence[29] | None | | Become a carbon-neutral city by 2050 using a 1990 baseline | • | | N/A | N/A |
| Raleigh[30] | None | | The city has committed to conducting a GHG inventory and setting citywide goals. | | | N/A | N/A |
| Richmond[31] | None | | Reduce community-wide GHG emissions 80% by 2050 using 2008 as a baseline. The goal has not been adopted by an executive order or city council resolution. | | Climate | 2.1% | 47% |
| Riverside[32] | Save 1% of community energy load annually between 2013 and 2023 | • | Reduce GHG emissions for 2020 by 26.4% and for 2035 by 49% | • | Energy | 1.0% | 34% |
| Sacramento[33] | Reduce residential and commercial energy use 25% by 2030 compared to 2005 baseline | • | Reduce GHG emissions 15% below 2005 baseline by 2020, 49% by 2035, and 83% by 2050 | • | Climate | 1.0% | N/A |
| Salt Lake City[34] | None | | Reduce GHG emissions 50% by 2030 and 80% by 2040 below 2009 baseline | • | Climate | 1.3% | N/A |

| City | Community energy goal[a] | Formally adopted | Community climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal[b] | Progress: projected reduction in target year[c] |
|---|---|---|---|---|---|---|---|
| San Antonio[35] | Reduce energy use for all buildings within the city from 116 kBTU/sq. ft. in 2014 to 90 kBTU/sq. ft. in 2040 | • | The city has conducted a GHG emissions inventory and is in the process of establishing future climate goals. | | Energy | 0.9% | N/A |
| San Diego[36] | Reduce energy use by 15% per residential unit in 20% of all housing units by 2020 and 50% of all units by 2035 | • | Reduce GHG emissions 15% from 2010 baseline by 2020, 40% by 2030, and 50% by 2035 | • | Climate | Met near-term target | 33% |
| San Francisco[37] | Implement energy-efficient policies for both residential and commercial buildings that will result in a decrease of 301,979 metric tons of carbon dioxide equivalent by 2030 | • | Reduce GHG emissions 25% below a 1990 baseline by 2017, 40% by 2025, and 80% by 2050 | • | Climate | 1.8% | 31% |
| San Jose[38] | Reduce community-wide energy consumption 50% below 2008 levels by 2022 | • | Met a planned GHG emissions efficiency threshold of 6.6 metric tons of CO2 equivalent per service population (population + jobs) per year (MT CO2e/SP/year) | • | Energy | 0.5% | 37% |

| City | Community energy goal[a] | Formally adopted | Community climate goal | Formally adopted | Goal used for scoring stringency and progress | Stringency: annual reduction needed to meet goal[b] | Progress: projected reduction in target year[c] |
|---|---|---|---|---|---|---|---|
| Seattle[39] | GHG emissions reduction goals for 2050 should come from a 45% reduction in commercial energy use and a 63% reduction in residential energy use below a 2008 baseline. | • | Reduce GHG emissions from buildings by 82% below 2008 baseline by 2050 to reach citywide net zero emissions | • | Climate | 2.6% | 35% |
| St. Louis[40] | None | | Reduce GHG emissions 25% by 2020 and 80% by 2050 below 2005 baseline | • | Climate | 5.3% | 0% |
| Tampa[41] | Reduce energy use across the city by 38.6% below expected business as usual projections for 2025 | | Reduce GHG emissions from 2009 to 1990 levels by 2025 | • | Climate | 0.8% | N/A |
| Virginia Beach[42] | Reduce energy consumption citywide 10% below 2006 levels by 2020 | • | None | | | 0.7% | N/A |
| Washington[43] | Reduce citywide energy use 50% below 2006 baseline by 2032 | • | Reduce citywide GHG emissions 50% below 2006 baseline by 2032 | • | Climate | 1.6% | 100% |

[a] Cities with energy goals for only one building sector were not scored for the stringency or progress metrics as these cities were not comparable to those that have adopted goals for the entire community. [b] Cities with both energy efficiency and climate goals were awarded points for stringency based upon the goal with the most stringent near-term annual target or the goal for which data were available. Unless otherwise noted, we converted the difference between a city's energy use or emissions levels for the year closest to that in which the goal was adopted and the nearest-term targeted goal into an average annual percentage energy savings or emissions reduction. [c] We projected the result of continuing the most recent rate of annual energy savings or emissions reductions until the goal's nearest-term target year to quantify the projected savings or reduction. We gave a city partial credit for being on track for its goal if it was projected to achieve a level of savings within 25% of its stated goal. We measured this as a 25% variation from a city's stated goal. For example, if a city aimed to reduce emissions by 40% and was projected to achieve a 30% reduction, it earned points because it was within 25% of its stated target. *Sources*: We gathered community-wide goals and data to project energy savings or GHG emissions reduction levels in target years from the following sustainability plans, climate action plans, GHG inventories, and other city-provided documentation. [1] CDP 2015; Atlanta 2015a; Atlanta 2015b; Atlanta 2016; CDP 2016; data request. [2] Austin 2015a; Austin 2015b; Austin Energy 2014a; CDP 2016; data request.

[3] Baltimore 2009; Baltimore 2013; Baltimore 2015; data request. [4] Boston 2007; Boston 2014b; Boston 2014c; CDP 2016. [5] Chicago 2008; ICF International 2012; Jones 2012; Chicago 2012; data request. [6] Cincinnati 2013; data request. [7] Cleveland 2013a; Cleveland 2015; CDP 2016; data request. [8] Because Columbus adopted its GHG emissions goal in 2016, we used the two most recent years of emissions data to calculate both the stringency and progress metrics. Columbus 2014; Columbus 2015; Columbus 2016; data request. [9] Dallas 2012b; Dallas 2015; CDP 2016; 2030 Districts 2017. [10] Denver 2014a; Denver 2014b; Denver 2014c; Denver 2015; data request. [11] DOE 2014; data request. [12] DOE 2014; Houston 2014; data request. [13] Kansas City 2008a; Kansas City 2008b; National League of Cities Sustainable Cities Institute 2014; Kansas City 2015; Kansas City 2016. [14] CDP 2015; Los Angeles 2015a; Los Angeles 2015b; Los Angeles 2016b; CDP 2016. [15] Louisville 2013; Louisville 2016; data request. [16] Data request. [17] Miami 2008a; Miami 2008b. [18] Milwaukee 2013a; Milwaukee 2013b; Milwaukee 2014. [19] Minneapolis 2012; Minneapolis 2013; Minneapolis 2014; Minneapolis 2015; data request. [20] Data request. [21] New Orleans 2009; New Orleans 2012; New Orleans 2015a; New Orleans 2015b; Compact of Mayors 2016; Entergy New Orleans 2016. [22] New York 2014a; New York 2014b; New York 2016a. [23] Data request. [24] Orlando has not conducted a GHG inventory to complement its emissions goal. We calculated the stringency of its goal by dividing the targeted percent reduction by the number of years between the city's baseline year and nearest-term target year. Orlando 2013; data request. [25] Because Philadelphia adopted its GHG emissions goal in 2016, we used the two most recent years of emissions data to calculate both the stringency and progress metrics. Philadelphia 2009; Philadelphia 2015; Philadelphia 2016b; Philadelphia 2016c; data request. [26] Phoenix 2013a; Phoenix 2016b; data request. [27] Pittsburgh 2012a; Pittsburgh 2012b; Pittsburgh 2015; data request. [28] Portland 2009a; Portland 2009b; Portland 2015; Portland 2017; C40 2017. [29] Providence 2016a; data request. [30] Raleigh 2016. [31] ICLEI 2010; Richmond 2012; Richmond 2014; data request. [32] Riverside 2010; Riverside 2012; Riverside Public Utilities 2013; CMUA 2015; EIA 2016a; Riverside 2016a. [33] Sacramento 2012; Sacramento 2015. [34] Salt Lake City 2015; Salt Lake City 2016a; Salt Lake City 2016b. [35] San Antonio 2011; San Antonio 2016. [36] San Diego 2016a; San Diego 2016b; CDP 2016; data request. [37] San Francisco 2008; San Francisco 2012; San Francisco 2013b; San Francisco 2015; C40 2017. [38] San Jose has adopted a carbon efficiency goal with the expectation that total community-wide emissions may initially rise while carbon emissions per capita decline. In order to compare San Jose with other cities in this scorecard, we used the city's 2035 goal because it is the nearest-term target with a decrease in total community-wide emissions. San Jose 2008; San Jose 2011a; San Jose 2011b; San Jose 2015a; San Jose 2015b; San Jose 2016a; San Jose 2016b; data request. [39] Seattle 2013a; Seattle 2013b; Seattle 2016; C40 2017. [40] St. Louis 2012; St. Louis 2013; St. Louis 2014; CDP 2016. [41] Tampa 2008; Atkins 2011; Tampa 2016a; data request. [42] Virginia Beach 2016a; data request. [43] District of Columbia 2012; District of Columbia 2013; District of Columbia 2016a; C40 2017.

Table C3. 2016 combined heat and power (CHP) capacity

| City | Population | Total city CHP capacity (MW) | CHP capacity per 100,000 people (MW) |
|---|---|---|---|
| Atlanta | 463,878 | 23.1 | 5.0 |
| Austin | 931,830 | 119.4 | 12.8 |
| Baltimore | 621,849 | 62.3 | 10.0 |
| Birmingham | 212,461 | 25.0 | 11.8 |
| Boston | 667,137 | 103.7 | 15.5 |
| Charlotte | 827,097 | 1.6 | 0.2 |
| Chicago | 2,720,546 | 66.2 | 2.4 |
| Cincinnati | 298,550 | 60.5 | 20.3 |
| Cleveland | 388,072 | 71.0 | 18.3 |
| Columbus | 850,106 | 0.1 | 0.0 |
| Dallas | 1,300,092 | 18.7 | 1.4 |
| Denver | 682,545 | 113.5 | 16.6 |
| Detroit | 677,116 | 88.7 | 13.1 |
| El Paso | 681,124 | 24.2 | 3.6 |
| Fort Worth | 833,319 | 14.7 | 1.8 |
| Hartford | 124,006 | 71.5 | 57.7 |
| Houston | 2,296,224 | 909.9 | 39.6 |
| Indianapolis | 853,173 | 22.9 | 2.7 |
| Jacksonville | 868,031 | 322.4 | 37.1 |
| Kansas City | 475,378 | 2.0 | 0.4 |
| Las Vegas | 623,747 | 252.5 | 40.5 |
| Los Angeles | 3,971,883 | 136.0 | 3.4 |
| Louisville | 615,366 | 0.0 | 0.0 |
| Memphis | 655,770 | 31.2 | 4.8 |
| Miami | 441,003 | 20.9 | 4.7 |
| Milwaukee | 600,155 | 304.9 | 50.8 |
| Minneapolis | 410,939 | 18.5 | 4.5 |
| Nashville | 654,610 | 22.2 | 3.4 |
| New Orleans | 389,617 | 13.3 | 3.4 |
| New York | 8,550,405 | 1,235.6 | 14.5 |
| Oklahoma City | 631,346 | 9.1 | 1.4 |
| Orlando | 270,934 | 131.1 | 48.4 |
| Philadelphia | 1,567,442 | 243.2 | 15.5 |

| City | Population | Total city CHP capacity (MW) | CHP capacity per 100,000 people (MW) |
|---|---|---|---|
| Phoenix | 1,563,025 | 0.1 | 0.0 |
| Pittsburgh | 304,391 | 5.1 | 1.7 |
| Portland | 632,309 | 2.0 | 0.3 |
| Providence | 179,207 | 14.9 | 8.3 |
| Raleigh | 451,066 | 11.0 | 2.4 |
| Richmond | 220,289 | 258.7 | 117.4 |
| Riverside | 322,424 | 52.3 | 16.2 |
| Sacramento | 490,712 | 442.8 | 90.2 |
| Salt Lake City | 192,672 | 36.2 | 18.8 |
| San Antonio | 1,469,845 | 13.9 | 0.9 |
| San Diego | 1,394,928 | 243.3 | 17.4 |
| San Francisco | 864,816 | 58.1 | 6.7 |
| San Jose | 1,026,908 | 61.1 | 5.9 |
| Seattle | 684,451 | 13.5 | 2.0 |
| St. Louis | 315,685 | 56.4 | 17.9 |
| Tampa | 369,075 | 6.1 | 1.7 |
| Virginia Beach | 452,745 | 2.4 | 0.5 |
| Washington | 672,228 | 23.0 | 3.4 |

*Source:* DOE 2016e

Table C4. Scores for urban heat island mitigation goals and policies

| City | Urban heat island mitigation goal | Goal score (0.5 pt) | Urban heat island mitigation policies | Low impact development policy | Tree protection ordinance | Land conservation or restoration policy | Policy score (2 pts) | Total score (2.5 pts) |
|---|---|---|---|---|---|---|---|---|
| Atlanta | Atlanta has entered an agreement with Trees Atlanta, a local nonprofit, to plant 4,000 15-gallon trees between 2015 and 2017. | 0.5 | Ordinance 16-O-1353<br>Ordinance 08-O-2071<br>Ordinance 2004-54 | | • | • | 2 | 2.5 |
| Austin | Austin uses different tree canopy coverage goals for individual neighborhoods to guide the city's tree-planting program. | 0.5 | Municipal Code 13-2-783<br>Municipal Code 13-7 | • | • | • | 2 | 2.5 |
| Baltimore | Double the city's urban tree canopy to 40% of land area by 2037 | 0.5 | Municipal Code 32 §15-401 | • | • | • | 2 | 2.5 |
| Chicago | The city has a goal to increase rooftop gardens to a total of 6,000 buildings citywide by 2020 and to plant an estimated 1 million trees by 2020. | 0.5 | Sustainable Development Policy | • | | • | 2 | 2.5 |
| Cincinnati | None | 0.5 | Green Roof Loans<br>Ordinance 15-2004 | • | | • | 2 | 2.5 |

| City | Urban heat island mitigation goal | Goal score (0.5 pt) | Urban heat island mitigation policies | Low impact development policy | Tree protection ordinance | Land conservation or restoration policy | Policy score (2 pts) | Total score (2.5 pts) |
|---|---|---|---|---|---|---|---|---|
| Denver | The Parks and Recreation Division has a goal of 18% canopy coverage for the city by 2025 in its Game Plan. This goal has been exceeded, as current canopy coverage is 19%. | 0.5 | Denver Energy Challenge Residential Loan<br>Denver Zoning Code 10.5.3 | • | • | | 2 | 2.5 |
| Houston | The city has set a goal to plant 1 million trees within five years. | 0.5 | Energy Code 502.5<br>Ordinance 2013-343 | • | | • | 2 | 2.5 |
| Los Angeles | The Sustainable City pLAn has set a goal to reduce urban/rural temperature differential by at least 1.7 degrees by 2025 and 3 degrees by 2035. | 0.5 | Ordinance 181899<br>Municipal Code Article 4.5 | • | | • | 2 | 2.5 |
| Louisville | Louisville Metro has a goal to achieve urban tree canopy coverage of 45%. | 0.5 | Green Infrastructure Incentives | • | | • | 2 | 2.5 |
| Miami | The Tree Master Plan has set a goal to increase tree canopy coverage 30% by 2020. | 0.5 | Zoning Code 3.13.2<br>Ordinance 13174<br>Zoning Code 3.14 | • | • | • | 2 | 2.5 |

| City | Urban heat island mitigation goal | Goal score (0.5 pt) | Urban heat island mitigation policies | Low impact development policy | Tree protection ordinance | Land conservation or restoration policy | Policy score (2 pts) | Total score (2.5 pts) |
|---|---|---|---|---|---|---|---|---|
| Minneapolis | The Minneapolis City Council adopted two quantitative goals that pertain to mitigating the urban heat island effect: maintain the city's 31% tree canopy level through 2015; and plant at least 6,000 trees annually on public land by 2015. | 0.5 | Municipal Code 2013-OR-099 | • | | • | 1 | 2.5 |
| Nashville | The Urban Forestry Master Plan has specific canopy goals for different neighborhoods within the city. | 0.5 | Low Impact Development Stormwater Management Manual<br>Municipal Code 17.40<br>Municipal Code 17.12.090 | • | • | • | 2 | 2.5 |
| New York | The city has a goal to coat 10 million square feet of rooftops white by 2025. | 0.5 | Watershed Conservation Easements | • | | • | 2 | 2.5 |
| Orlando | The Green Works Orlando Community Action Plan includes a goal to increase the city's urban tree canopy coverage to 27% by 2018 and 40% by 2040. | 0.5 | Municipal Code 58-6<br>Municipal Code 60-2B<br>Municipal Code 58-3E | • | • | • | 2 | 2.5 |
| Philadelphia | The Greenworks plan has a goal to increase tree canopy to 30% of the city by 2025. | 0.5 | City Bill 090923<br>City Bill 130274 | • | | • | 2 | 2.5 |

| City | Urban heat island mitigation goal | Goal score (0.5 pt) | Urban heat island mitigation policies | Low impact development policy | Tree protection ordinance | Land conservation or restoration policy | Policy score (2 pts) | Total score (2.5 pts) |
|---|---|---|---|---|---|---|---|---|
| Portland | The Climate Action Plan establishes the 2030 Objective to reduce effective impervious areas by 600 acres and expand urban forest canopy to cover at least one-third of the city. | 0.5 | Municipal Code 33.510.210<br>Municipal Code Title 11 | • | • | • | 2 | 2.5 |
| Sacramento | Plant 1,000 new trees annually until achieving 35% urban canopy. | 0.5 | Cool Roof Rebates<br>Ordinance 2016-0026 | • | • | | 2 | 2.5 |
| Salt Lake City | The urban forestry program aims to increase the number of trees 2% annually. | 0.5 | Municipal Code 21A.48.135<br>Municipal Code 21A.27.020 | | • | • | 2 | 2.5 |
| San Antonio | The city has a goal to increase tree canopy coverage from 30% to 40%. | 0.5 | Municipal Code 35-523<br>Municipal Code 35-360<br>Municipal Code 35-203 | | • | • | 2 | 2.5 |
| Seattle | Seattle currently has a 23% tree canopy cover and a goal to reach 30% by 2037. | 0.5 | Municipal Code 23.43.012<br>Municipal Code 23.58A.040 | • | • | • | 2 | 2.5 |
| Tampa | The city has a goal of zero net loss of tree canopy coverage with goals established for each city's municipal district. | 0.5 | Municipal Code Chapter 13<br>Municipal Code 27-141 | | • | • | 2 | 2.5 |

| City | Urban heat island mitigation goal | Goal score (0.5 pt) | Urban heat island mitigation policies | Low impact development policy | Tree protection ordinance | Land conservation or restoration policy | Policy score (2 pts) | Total score (2.5 pts) |
|---|---|---|---|---|---|---|---|---|
| Washington | The city has a goal to increase the urban tree canopy to 40% of land area. The city also has a goal to increase wetland acreage by the Anacostia and Potomac Rivers by 50%. | 0.5 | Municipal Code 11-C4 | • | • | | 2 | 2.5 |
| Indianapolis | None | 0 | Municipal Code 744-509<br>Zoning Ordinance 744-203D | • | | • | 2 | 2 |
| New Orleans | None | 0 | Zoning Ordinance 5.3<br>Zoning Ordinance 5.4 | • | | • | 0 | 2 |
| Raleigh | None | 0 | Unified Development Ordinance 9.1<br>Unified Development Ordinance 2.4 | | • | • | 2 | 2 |
| Charlotte | Charlotte's City Council formally adopted a goal of 50% tree canopy coverage by 2050. | 0.5 | Ordinance 4521 | | • | | 1 | 1.5 |
| Cleveland | The Cleveland Tree Plan was adopted by the Cleveland Planning Commission in March 2016. One of its major goals is to increase tree canopy coverage to 40% by 2040. | 0.5 | Green Infrastructure Grants | • | | | 1 | 1.5 |
| Fort Worth | The city's tree canopy coverage goal is 30%. | 0.5 | Ordinance 18615-05-2009 | | • | | 1 | 1.5 |

| City | Urban heat island mitigation goal | Goal score (0.5 pt) | Urban heat island mitigation policies | Low impact development policy | Tree protection ordinance | Land conservation or restoration policy | Policy score (2 pts) | Total score (2.5 pts) |
|---|---|---|---|---|---|---|---|---|
| Hartford | Hartford has pledged to plant 20,000 trees in 20 years between 2010 and 2030, increasing the city's tree canopy coverage by 10%. | 0.5 | Ordinance 11-11 | | • | | 1 | 1.5 |
| Kansas City | The city's goal is to increase urban tree canopy coverage to 40%. | 0.5 | Municipal Code 88-410 | | | • | 1 | 1.5 |
| Las Vegas | The city passed the Urban Forestry Initiative in 2008 to improve air quality, reduce the urban heat island effect, and increase quality of life in terms of shade, beauty, and privacy for Las Vegas residents. The plan includes a goal to increase tree canopy coverage to 20% by 2035. | 0.5 | Ordinance 6524 | • | | | 1 | 1.5 |
| Milwaukee | The ReFresh Milwaukee Sustainability Plan contains a goal of doubling tree canopy coverage in Milwaukee to 40% by 2023. | 0.5 | Green Infrastructure Funding | • | | | 1 | 1.5 |

| City | Urban heat island mitigation goal | Goal score (0.5 pt) | Urban heat island mitigation policies | Low impact development policy | Tree protection ordinance | Land conservation or restoration policy | Policy score (2 pts) | Total score (2.5 pts) |
|---|---|---|---|---|---|---|---|---|
| Pittsburgh | The Urban Forest Master Plan has a goal to increase tree canopy coverage to 60% by 2032. | 0.5 | Ordinance 2010-0567 | • | | | 1 | 1.5 |
| Providence | Sustainable Providence reiterates the city's commitment to increase tree canopy coverage from 23% to 30% and places priority on planting trees in low-canopy neighborhoods. | 0.5 | Ordinance 27-6-603 | | | • | 1 | 1.5 |
| Riverside | Riverside's goal in its Green Action Plan is to increase the city's urban forest by planting at least 1,000 trees in city parks/right-of-ways and 3,000 trees on private property annually. | 0.5 | Cool Roof Rebates | • | | | 1 | 1.5 |
| San Francisco | The city has a goal of increasing the tree canopy of the urban forest to 25% of city land area by 2030. | 0.5 | Ordinance 221-16 | • | | | 1 | 1.5 |

| City | Urban heat island mitigation goal | Goal score (0.5 pt) | Urban heat island mitigation policies | Low impact development policy | Tree protection ordinance | Land conservation or restoration policy | Policy score (2 pts) | Total score (2.5 pts) |
|---|---|---|---|---|---|---|---|---|
| San Jose | The city has a goal to plant 100,000 new trees by 2022 as part of its Green Vision plan. | 0.5 | Municipal Code 13.32.020 | | • | | 1 | 1.5 |
| Virginia Beach | In 2014, the city adopted a goal of 45% urban tree canopy coverage over the next 20 years. | 0.5 | Municipal Code 1965 § 33-7.3 | | | • | 1 | 1.5 |
| Birmingham | None | 0 | Zoning Ordinance 3.2 | | | • | 1 | 1 |
| Dallas | None | 0 | Ordinance 122428 | • | | | 1 | 1 |
| El Paso | None | 0 | Ordinance 18349 | | | • | 1 | 1 |
| Jacksonville | None | 0 | Municipal Code 656.1201 | | • | | 1 | 1 |
| Richmond | None | 0 | Ordinance 2012-201-199 | • | | | 1 | 1 |
| Boston | The Greenovate Boston and Grow Boston Greener programs aim to increase Boston's tree canopy to 35% by 2030. | 0.5 | None | | | | 0 | 0.5 |
| Columbus | The city has created Branch Out Columbus with a goal to plant 300,000 trees by 2020 that would increase the tree canopy from 22% to 27%. | 0.5 | None | | | | 0 | 0.5 |

| City | Urban heat island mitigation goal | Goal score (0.5 pt) | Urban heat island mitigation policies | Low impact development policy | Tree protection ordinance | Land conservation or restoration policy | Policy score (2 pts) | Total score (2.5 pts) |
|---|---|---|---|---|---|---|---|---|
| Phoenix | The city has adopted a Tree and Shade Master Plan that has a goal to achieve a 25% tree canopy by 2030 from the current canopy of 12%. | 0.5 | None | | | | 0 | 0.5 |
| San Diego | The Climate Action Plan has a goal to increase urban tree canopy coverage, with a target to achieve 15% coverage by 2020 and 35% coverage by 2035. | 0.5 | None | | | | 0 | 0.5 |
| St. Louis | Increase the number of trees planted by 16,000 or an additional 15% of canopy cover | 0.5 | None | | | | 0 | 0.5 |
| Detroit | None | 0 | None | | | | 0 | 0 |
| Memphis | None | 0 | None | | | | 0 | 0 |
| Oklahoma City | None | 0 | None | | | | 0 | 0 |

Table C5. Complete streets policies by city

| City | Complete streets policy | Year of adoption | NCSC score (out of 100) | ACEEE *Scorecard* score (2 pts) |
|---|---|---|---|---|
| Indianapolis | Chapter 431, Article VIII | 2012 | 92.8 | 2 |
| Austin | Council Resolution No. 20131212-080 | 2014 | 88.8 | 2 |
| Los Angeles | Regional | | | |
| Richmond | Resolution No. 2014-R172-170 | 2014 | 82.4 | 2 |
| Birmingham | Resolution | 2011 | 79.2 | 2 |
| New Orleans | Ordinance No. 24706 | 2011 | 70.8 | 1.5 |
| Washington | Departmental Order 06-2010 (DDOT Complete Streets Policy) | 2010 | 66.4 | 1.5 |
| Virginia Beach | Complete Streets Administrative Directive | 2014 | 62.4 | 1.5 |
| Baltimore | Council Bill 09-0433 | 2010 | 58.0 | 1.5 |
| Memphis | Executive Order 01-2013 | 2013 | 57.6 | 1.5 |
| Phoenix | Ordinance S-41094 and Ordinance G-5937 | 2014 | 54.0 | 1.5 |
| Cleveland | Ordinance No. 798-11 | 2011 | 53.2 | 1.5 |
| Seattle | Ordinance No. 122386 | 2007 | 52.8 | 1.5 |
| Denver | Complete Streets Policy | 2011 | 52.4 | 1.5 |
| Houston | City Executive Order 1-15 | 2013 | 51.6 | 1.5 |
| Nashville | Executive Order No. 40 | 2010 | 50.0 | 1.5 |
| St. Louis | Board Bill No. 7 | 2010 | 49.6 | 1 |
| Philadelphia | Bill No. 12053201 | 2012 | 46.4 | 1 |
| Salt Lake City | Ordinance No. 4-10 | 2010 | 44.0 | 1 |
| San Antonio | Complete Streets Policy | 2011 | 40.8 | 1 |
| Chicago | Safe Streets for Chicago | 2006 | 39.6 | 1 |
| San Francisco | Public Works Code 2.4.13 (Ordinance No. 209-05) | 2008 | 37.2 | 1 |
| Tampa | Resolution No. 2814 | 2012 | 35.6 | 1 |
| Columbus | Resolution | 2008 | 29.2 | 1 |
| Boston[1] | Complete Streets Guidelines | 2009 | — | 0.5 |
| Dallas | Complete Streets Initiative | 2011 | — | 0.5 |
| New York | Sustainable Streets Strategic Plan | 2008 | — | 0.5 |
| Fort Worth[2] | Complete Streets Policy | 2016 | --- | 0.5 |
| Atlanta[3] | Complete Streets Policy | 2016 | --- | 0.5 |

| | | | | |
|---|---|---|---|---|
| Portland[4] | Oregon State Complete Streets Legislation | 1971 | — | 0.5 |
| Miami | Resolution No. 09-00274 | 2009 | 24.4 | 0.5 |
| Providence | Resolution | 2012 | 21.2 | 0.5 |
| Las Vegas[5] | Regional Transportation Commission (RTC) of Southern Nevada Complete Streets policy | 2012 | — | 0.5 |

[1] While Boston does not have a codified complete streets policy, the city has made every effort to include complete streets principles in all road creation and retrofit projects. [2] Fort Worth 2016. [3] Atlanta has adopted a complete streets policy, but it is not yet scored by NCSC. [4] Oregon's complete streets policy is the only state policy to cover municipal roads in addition to state-owned roads, and the city has made significant efforts to incorporate complete streets language in a range of supporting transportation and land use policies. Nevertheless, the city does not have an NCSC-recognized complete streets policy. [5] Las Vegas does not have its own complete streets policy but has incorporated the RTC complete streets policy into Title 19.04 of its municipal code. *Sources:* NCSC 2016, ACEEE web research, data requests.

**Table C6. Summary of scoring on transportation plans and targets**

| City | Sustainable transportation policy | Score |
|---|---|---|
| Boston | Boston's Climate Action Plan includes a VMT reduction goal of 7.5% below 2010 levels by 2020. Targeted policies that will be used to achieve this goal include the implementation of complete streets policies, expanding and maintaining public transit facilities, mode shift, and parking freezes.[1] | 4 |
| Jacksonville | Jacksonville's Planning and Development Department 2030 Mobility Plan includes a VMT per capita reduction target of 10% by 2030 along with a comprehensive multimodal plan in place to achieve that VMT reduction.[2] | 4 |
| Los Angeles | The Sustainable City pLAn established a citywide goal to reduce daily VMT per capita 5% from 2012 levels by 2025 and 10% by 2035.[3] | 4 |
| Louisville | Through Mayor Greg Fischer's release of Sustain Louisville, the city's sustainability plan, Louisville Metro Government set a goal in 2012 to reduce VMT 20% by 2025. Strategies include launching a bike share program, implementing a car share program, promoting bus ridership, and improving bicycle facilities and support for bicycle commuting.[4] | 4 |
| Portland | The 2009 Portland Climate Action Plan, adopted by the city council (Resolution 36748), includes a goal to reduce per capita daily VMT by 30% from 2008 levels by 2030. Additionally, Portland has a goal to achieve a 70% transit and active transportation mode share by 2030.[5] | 4 |
| San Francisco | The San Francisco Municipal Transportation Agency has adopted performance targets for GHG emissions in its regional San Francisco Transportation Plan 2040.[6] | 4 |
| Seattle | Seattle adopted Resolution 31312 in October 2011 calling for a 14% reduction in passenger VMT by 2020 and a 20% reduction in VMT by 2030 from 2008 levels.[7] | 4 |
| Atlanta | Atlanta's Climate Action Plan provides a specific plan to reduce VMTs by 20% from 2009 baseline by 2020. Strategies to meet this goal include promoting EV purchasing, parking pricing, transit investment, and modal share.[8] | 3 |

| City | Sustainable transportation policy | Score |
|---|---|---|
| Austin | Austin has a comprehensive plan in place to develop a more compact and connected city that provides integrated and affordable transportation. They also have a GHG emissions goals for transportation sector.[9] | 3 |
| Chicago | The Sustainable Chicago 2015 Action Agenda includes a goal to make Chicago the most bike- and pedestrian-friendly city in the country, with specific actions to increase bicycling and walking, such as adding up to 100 miles of new bicycle lanes, introducing bicycle sharing, and developing a pedestrian master plan. Another goal is to increase transit ridership.[10] | 3 |
| Cleveland | As part of the Cleveland Climate Action Plan, the city has a goal to reduce GHG emissions from the transportation sector by 250,000 metric tons of CO2 equivalent by 2030 using a 2010 baseline.[11] | 3 |
| Kansas City | Kansas City's Climate Protection Plan, adopted in 2013, has a goal to reduce citywide VMTs to 20% below 2000 levels by 2020 and 30% below 2000 levels by 2030. However the city is not actively implementing a plan to achieve its target.[12] | 3 |
| Orlando | Orlando's 2040 Long Range Transportation Plan includes land use forecasts for VMT reduction.[13] | 3 |
| Philadelphia | Philadelphia's Greenworks plan aims to reduce VMT in the city 10% below 2005 levels by 2015. While the goal is not legally codified, the city has made considerable progress toward achieving it. As of 2013, the city has seen an overall reduction in miles of 7.4% below 2005 levels.[14] | 3 |
| Pittsburgh | Pittsburgh's Climate Action Plan outlines strategies for reducing GHG emissions from transportation. The mayor of Pittsburgh has also adopted a goal to reduce citywide transportation GHG emissions 50% by 2030.[15] | 3 |
| Riverside | Riverside's Green Action Plan looks to decrease VMT 15% by 2015 based on a 2009 baseline. Specific strategies include encouraging the use of bicycles by increasing the number of bike trails, promoting alternative modes of transportation by implementing benefit programs for city employees and local businesses, and expanding public transit within city limits.[16] | 3 |
| Salt Lake City | Salt Lake City has a goal to reduce VMT in the city 6.5% by 2015. Several comprehensive strategies discussed in the Sustainable Salt Lake plan aim to reduce VMT.[17] | 3 |
| San Antonio | The SA2020 city plan includes a loose, noncodified VMT reduction goal of 10% per capita by 2020.[18] | 3 |
| San Diego | San Diego's Climate Action plan has a specific goal to reduce GHG emissions by 110,000 metric tons of CO2 equivalent by 2035.[19] | 3 |
| Washington | The MoveDC plan explores strategies for ensuring that the transportation system makes the city more livable, sustainable, prosperous, and attractive. DC's Climate Plan, Clean Energy DC, describes how multimodal strategies in MoveDC will help contribute to the city's overall energy reduction goal.[20] | 3 |

| City | Sustainable transportation policy | Score |
|---|---|---|
| Charlotte | The City of Charlotte Transportation Action Plan outlines short-term and long-term policies including plans to better integrate land use and transportation to increase the sustainability of its entire transportation system.[21] | 2 |
| Denver | The 2020 Sustainability Community Mobility Goal is to "provide mobility options (transit, carpooling, biking, walking) that reduce commuting travel in Denver done in single-occupant vehicles to no more than 60% of all trips." The Blueprint Denver plan is the city's primary integrated land use and transportation plan. In addition, in 2014 the city adopted the Transit Oriented Denver Strategic Plan update, which goes one step further to identify development capacity and needs at all fixed rail stations as density increases.[22] | 2 |
| Las Vegas | The City of Las Vegas has a Mobility Master Plan that makes recommendations for vehicular, transit, bicycle, and pedestrian improvement over a 20-year time frame.[23] | 2 |
| Minneapolis | Minneapolis's Climate Action Plan, adopted in June 2013, includes a detailed plan to hold VMT flat and has a specific target for a bicycle mode share of 7% by 2014.[24] | 2 |
| New Orleans | New Orleans has a metropolitan transportation plan that outlines a vision for creating and maintaining a transportation system that will promote, livable, equitable, economically viable, and environmentally sustainable communities for future generations. Objectives in the plan include encouraging clean and more efficient vehicle use and expanding transportation choices beyond single-occupancy vehicles for all households.[25] | 2 |
| New York | PlaNYC and Sustainable Streets show that the city is moving toward creating a multimodal and sustainable transportation system with improved use of public transit, complete streets strategies, and additional bike and pedestrian infrastructure.[26] | 2 |
| Sacramento | Sacramento's Metropolitan Transportation Plan/Sustainable Communities Strategy outlines strategies to create a transportation system that supports smart land use, environmental quality and sustainability, access and mobility, equity and choice, and economic vitality for all people.[27] | 2 |
| Dallas | Dallas adopted an annual VMT reduction target of 10% as part of the ISO 14001:2004–certified Environmental Management System. The city has made concerted efforts to encourage workers to telecommute, carpool, and use flex schedules and mass transit to reduce overall VMT.[28] | 1 |
| El Paso | Plan El Paso offers a comprehensive approach toward reducing VMT by using land use patterns that support walkability, livability, and sustainability in the long run. The city has not adopted a VMT target.[29] | 1 |
| Milwaukee | The ReFresh Milwaukee plan includes a number of transportation-related strategies and qualitative goals to improve the overall efficiency of the city's transportation system.[30] | 1 |
| Phoenix | Phoenix's Sustainability Report is a comprehensive plan that discusses strategies for improving the sustainability of its transportation system.[31] | 1 |

| City | Sustainable transportation policy | Score |
|---|---|---|
| Providence | The city's Sustainability Plan has a chapter dedicated to sustainable transportation strategies. It also tracks vehicle miles travelled as a key metric for implementation.[32] | 1 |
| Richmond | Richmond's Sustainability Plan, RVAgreen contains a transportation section with multiple strategies for reducing VMT.[33] | 1 |
| San Jose | The Envision San Jose 2040 General Plan aims to reduce automobile mode share 40% by 2040. The focus of the general plan is to concentrate new development along mass transit lines.[34] | 1 |
| St. Louis | St. Louis outlines strategies to increase energy efficiency in transportation as part of its Sustainability Plan.[35] | 1 |
| Tampa | Tampa's Comprehensive Plan contains strategies to increase transportation efficiency.[36] | 1 |
| Virginia Beach | The city addresses sustainable transportation as part of a broader city plan that contains several strategies to reduce VMT, but there are no specific, codified goals in place.[37] | 1 |

[1] Boston 2014c. [2] Jacksonville 2011. [3] Los Angeles 2015b. [4] Louisville 2013. [5] Portland 2009a. [6] SFMTA 2016. [7] Data request. [8] Atlanta 2015a. [9] Austin 2015a. [10] Chicago 2012. [11] Cleveland 2013a. [12] Kansas City 2008b. [13] Orlando 2015. [14] Dews et al. 2014. [15] Pittsburgh 2015. [16] Riverside 2012. [17] Salt Lake City 2015. [18] San Antonio 2011. [19] San Diego 2016b. [20] District of Columbia 2014b; District of Columbia 2016b. [21] Charlotte 2011. [22] Data request. [23] Data request. [24] Minneapolis 2013. [25] New Orleans Regional Planning Commission 2015. [26] New York 2015. [27] Sacramento 2016b. [28] Dallas 2014. [29] El Paso 2012. [30] Milwaukee 2015. [31] Phoenix 2016b. [32] Providence 2014. [33] Richmond 2014. [34] San Jose 2011b. [35] Data request. [36] Tampa 2016b. [37] Virginia Beach 2013.