Mayors Climate Protection Center

How Energy Technologies Are Reshaping America's Cities

A 178-City Survey

January 2016

THE UNITED STATES CONFERENCE OF MAYORS

The U.S. Conference of Mayors is the official nonpartisan organization of cities with populations of 30,000 or more. There are 1,398 such cities in the country today, each represented in the Conference by its chief elected official, the Mayor.

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Foreward

Tom Cochran
CEO and Executive Director
The United States
Conference of Mayors

The Conference of Mayors is pleased to release this survey, *How Energy Technologies Are Reshaping America's Cities,* providing new information on how mayors are deploying energy technologies they consider to be most effective in advancing their climate and energy goals.

Specifically, mayors have once again identified these three technologies – LED lighting, low-energy buildings and solar electricity generation – as the "most promising" energy technologies for reducing their future energy use and carbon emissions.

As the findings in this report show, mayors are saving taxpayers money, reducing energy use, curbing harmful air emissions, and making cities more efficient as they adapt new technologies to the challenges before them.

Last month, Conference leaders joined with other mayors throughout the world in Paris at COP21 to showcase the role of mayors everywhere in addressing global climate change. This survey, likes others before it, underscores how U.S. mayors continue to lead and show there are practical solutions to this problem.

But these local efforts are constrained, as the report findings indicate, with the survey respondents often citing financial concerns limiting their ability to deploy these technologies more broadly in their cities. Finding additional ways to accelerate the use of these technologies by supporting these city efforts is especially crucial to the nation's energy and climate goals.

With national elections on the horizon, these findings should inspire candidates to consider additional federal polices to spur more innovation and investment in new energy technologies in cities and their local areas, especially since this is where even more Americans will live and work in the future and continue to drive the U.S. economy.

Survey Results

This new survey, *How Energy Technologies Are Reshaping America's Cities*, builds upon a similar Conference of Mayors' survey undertaken two years earlier.

The Conference found then that these three energy technologies — *LED (light-emitting diodes) Lighting, Low-energy Buildings, and Solar Electricity Generation* — were cited most often by mayors as the "most promising" technologies for reducing energy use and carbon emissions in cities.

These "most promising" technologies were overwhelmingly affirmed (91% of respondents) by the 178 cities that responded to this survey; the other nine percent identified at least one, if not two, of these technologies as "most promising." As such, nearly all survey participants concurred with these priorities.

LED Lighting, Low-energy Buildings, and Solar Electricity Generation, identified from among 17 technologies, were targeted in this survey for further inquiry, with an emphasis on city-led deployment efforts and initiatives.

All told, these survey findings provide new information on mayoral and city leadership to advance these three "most promising" energy technologies for reducing energy use and carbon emissions in cities.

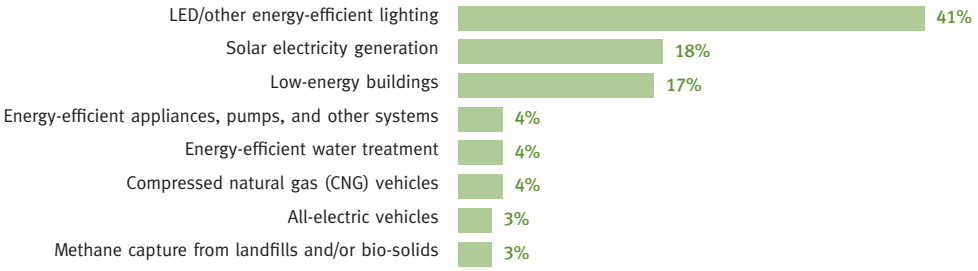
More than four in ten cities are making LED/energy-efficient lighting technology their top priority over the next 24 months. Mayors chose LED/energy-efficient lighting (41%) as the energy technology receiving top priority in their cities within the next two years. Notably, cities in this survey are placing more priority on LED lighting than two years ago, when this technology led all others with a 29 percent share.

In addition to lighting technology, mayors again rank solar electricity generation (18%) and low-energy buildings (17%) as their second and third priorities, the same order as found in the 2014 survey and about the same relative shares.

More than three in four cities (totaling 76%) made one of these three technologies their top priority over the next 24 months; in the 2014 survey, two in three cities (66%) give priority to one of these three technologies.

Technologies Receiving 'Top Priority' within Next Two Years

(percentage of cities)



Public buildings and outdoor lighting remain the top services that cities are targeting most for improved energy efficiency or reduced energy consumption. More than three-quarters of all cities (77%) are directing their energy efficiency efforts to public buildings, with nearly two-thirds (64%) prioritizing outdoor lighting for improvements.

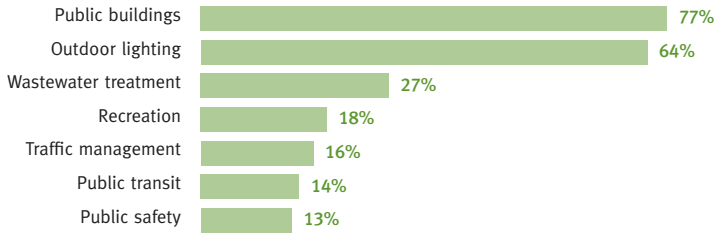
Compared to the 2014 survey, outdoor lighting's share increased markedly (from 54% to 64%), with public buildings declining slightly (from 83% to 77%).

More than one in four cities (27%) is targeting wastewater treatment, up from 21 percent in 2014. In the Conference's last three energy surveys (2011, 2014 and 2016), public buildings, outdoor lighting and wastewater treatment are consistently the top three city priorities, in that order.

A number of cities are also working to improve energy efficiency in other important areas, as shown below.

Broad Areas Currently Targeted by Cities for Energy Efficiency or Reduced Energy Consumption

(percentage of cities)

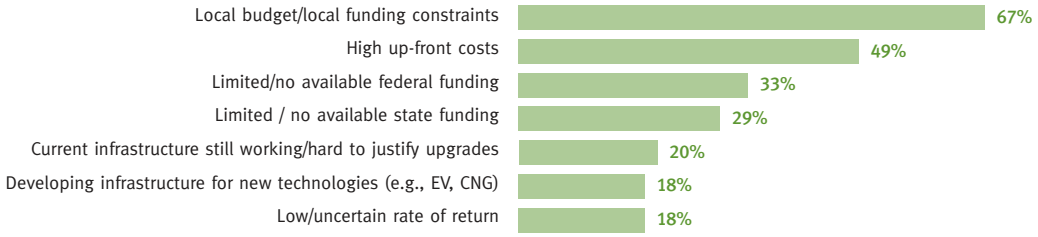


When asked to identify the "most significant" challenges in advancing energy efficiency and conservation in these areas, survey respondents overwhelmingly cited financial constraints. Local budget/local funding constraints (67%), high up-front costs (49%), limited/no available federal funding (33%), and limited/no available state funding (29%) were chosen as the top four challenges before cities.

In the table below, only seven of the 14 potential responses are displayed, showing only those in double digits.

Most Significant Challenges to Increasing Energy Efficiency and Conservation in these Areas

(percentage of cities)



BUILDINGS

In the Conference's 2014 survey, the priority placed on improving the energy performance of city-owned building was well described and documented.

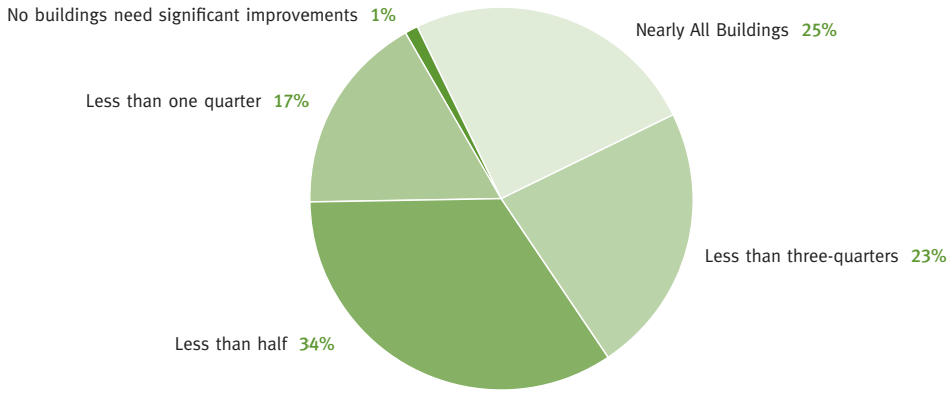
In this survey, additional issues about Low-energy Buildings were examined, from queries about benchmarking the energy performance of buildings, both municipal and non-municipal, to gathering information on buildings in need of significant energy improvements.

To broadly quantify the scale of outstanding retrofit needs, cities were asked to estimate the share of city-owned buildings that are "currently available for significant energy efficiency retrofits or improvements."

One in two cities indicated that fewer than half of their buildings are available for "significant" retrofits or improvements. Despite progress being made in improving the energy performance of their own buildings, one-quarter of all respondents (25%) indicated that nearly all their city buildings are still available for significant retrofits or improvements.

City-Owned Buildings Currently Available for Significant Energy Efficiency Retrofits or Improvements

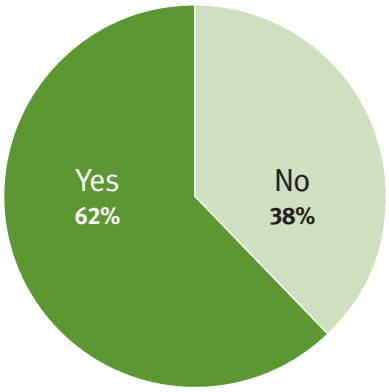
(percentage of cities)



More than three in five cities now benchmark the energy performance of their own city buildings. Increasing the energy performance of buildings through benchmarking is now a common practice in both the public and private sectors, especially as tracking tools are more readily available and easier to access, such as the ENERGY STAR Portfolio Manager. (This question and many others that follow are new areas of inquiry; as such, there is no baseline information for comparison purposes.)

Cities Benchmarking the Energy Performance of City-Owned Buildings

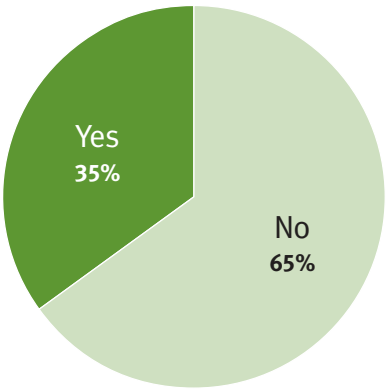
(percentage of cities)



More than one in three cities "encourages" the benchmarking of the energy performance of non-municipal buildings. Notably, cities that benchmark their own municipal buildings are almost twice as likely to "encourage" this practice by other building owners in their cities.

Share of Cities Encouraging the Benchmarking of the Energy Performance of Non-Municipal Buildings

(percentage of cities)



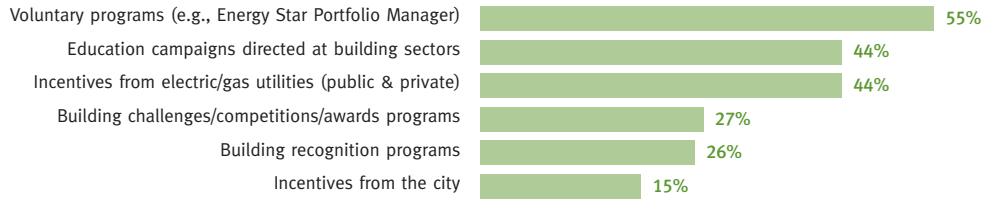
In a separate query, cities were asked if they "required" through local ordinance or regulation the benchmarking of the energy performance of non-municipal buildings; nearly thirteen percent of the respondence (22 cities) indicated they require benchmarking by owners of non-municipal buildings.

For those cities that "encourage" the benchmarking of the energy performance of non-municipal buildings, more than half rely on voluntary programs. In addition to the majority of cities with voluntary programs (55%), nearly half of the cities sponsor education campaigns directed at building sectors (44%) or offer incentives from public and private electric/gas utilities (44%).

Nearly three-quarters of the cities encouraging benchmarking by businesses, residents and others do offer at least two or more programs (most shown in this chart).

How These Cities Encourage the Benchmarking of the Energy Performance of Non-Municipal Buildings

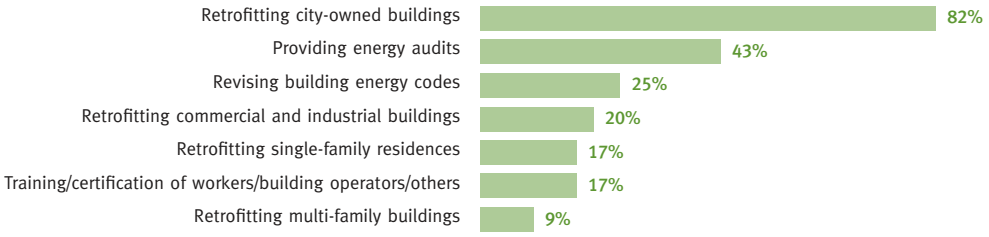
(percentage of cities)



More than four in five mayors identified the energy retrofit of city-owned buildings as their highest priority for improving the energy efficiency of their city's building stock. In raising the energy efficiency of city buildings, mayors are overwhelmingly targeting city-owned buildings for energy retrofits (82%), with more than two in five cities (43%) providing energy audits for public and private buildings. One-quarter of the cities (25%) are revising building energy codes, with one in five cities (20%) making the retrofitting of commercial and industrial buildings a priority.

City Activities for Improving Building Energy Efficiency

(percentage of cities)



NOTE: Includes up to three responses per city.

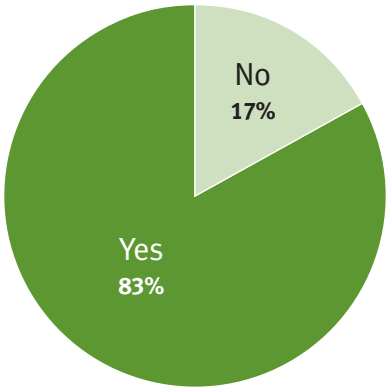
LED LIGHTING

More than four in five cities have already deployed LED lighting. The broad deployment of the various forms of this energy technology by cities (83%) was largely expected given its dominance in previous survey findings.

How this technology is actually being deployed was examined more extensively in this survey for the first time, as shown in the following series of charts and findings.

Share of Cities That Have Already Deployed LED Lighting

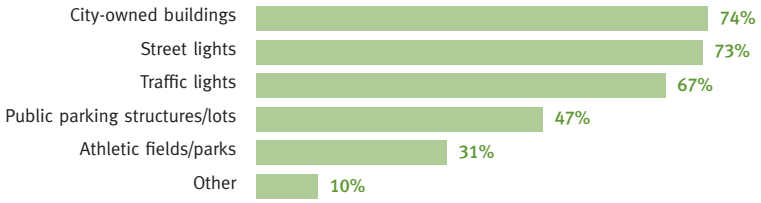
(percentage of cities)



For LED lighting adopters, nearly three in four cities used this technology in their city-owned buildings and for street lighting. In addition to deploying LEDs in city-owned buildings (74%) and for street lights (73%), nearly two in three of these cities used this technology in traffic lights (67%) and nearly half for public parking structures/lots (47%). LED lighting has already been deployed at athletic fields/parks by nearly one third of these cities.

Where Cities Have Already Deployed LED Lighting

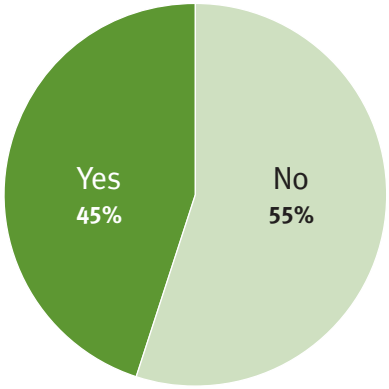
(percentage of cities)



Nearly half of all survey respondents have a formal/informal plan for deploying LED lighting more broadly in their cities. Of these cities with a LED plan (45%), these same cities responded to additional questions about elements of their plans and barriers to further adoption of this technology as described in the series of charts that follow.

Share of Cities with a Plan for Deploying LED Lighting

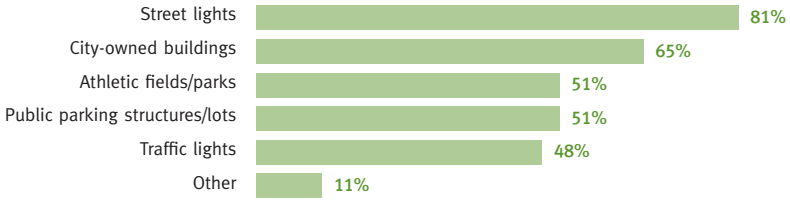
(percentage of cities)



More than four in five cities with LED lighting plans are targeting street lights, with nearly two-thirds focusing on city-owned buildings. In addition to street lights (81%) and city-owned buildings (65%), about half of all cities are targeting athletic fields (51%) and public parking structures/lots (51%).

Facilities Targeted in LED Lighting Plans

(percentage of cities)

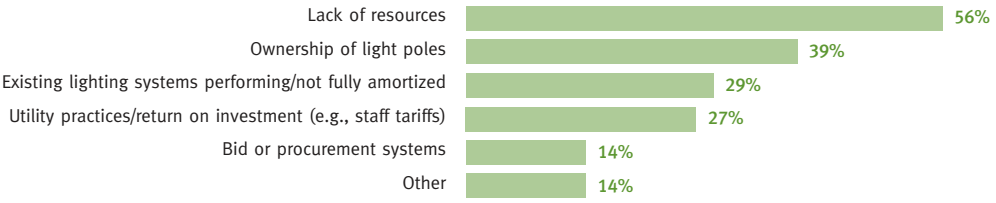


A sizable majority of cities with LED deployment plans identified a lack of resources as the "most significant" barrier to the broader deployment of this technology. Citing the lack of resources (56%) as the most significant barrier, nearly four in ten cities (39%) identified the ownership of light poles as the second most significant barrier to the broader deployment of LED lighting.

Cities chose from among eight potential barriers, with only five receiving double-digit responses, as shown in the chart below. Nearly one in six cities (14%) selected "other" barriers and identified those in their own words, with one city noting special charges by the local utility to change-out existing lights or the lack of transparency from the utility about the costs of the lighting as compared to other costs.

Most Significant Barriers to the Deployment of City LED Lighting Plans

(percentage of cities)

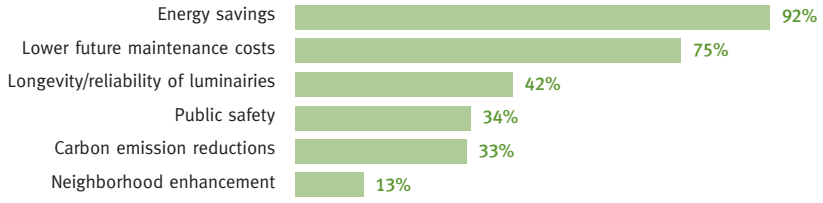


NOTE: Includes up to three responses per city.

Energy savings was identified as the top benefit of LED lighting by nearly every city with a LED deployment plan, with three in four cities selecting lower future maintenance costs as their second choice. Beyond the benefits of energy savings (92%) and lower future maintenance costs (75%), cities also cited longevity/reliability of the luminaires (42%) and public safety (34%) as important benefits.

Benefits of Deploying LED Lighting

(percentage of cities)

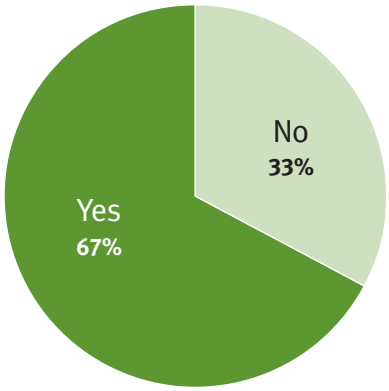


NOTE: Includes up to three responses per city.

Two-thirds of all survey respondents indicated they were aware of the technology called "connected lighting systems." This sizable majority of cities (67%) indicated a familiarity with "connected lighting systems," a technology that generally refers to lighting that is monitored and managed using software and is embedded in a city building(s) or city infrastructure.

Share of Cities Familiar with "Connected Lighting Systems"

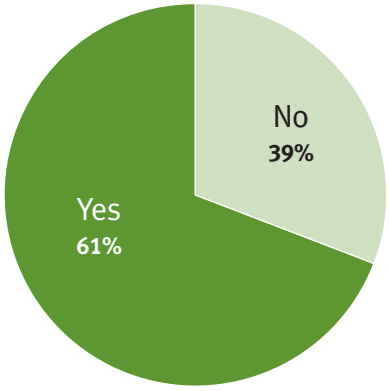
(percentage of cities)



Of those cities aware of "connected lighting systems," about six in ten are now considering the deployment of these technologies. A sizable majority (61%) of those cities familiar with "connected lighting systems" are considering deployment, which represents nearly four in ten (39%) of all survey respondents.

Cities Considering Deployment of "Connected Lighting Systems"

(percentage of cities)



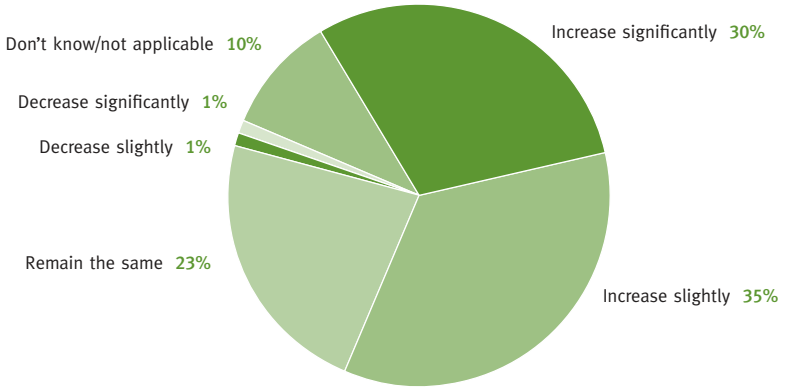
SOLAR

Nearly two in three cities over the next five years expect to increase the deployment of solar energy technologies on city buildings and facilities. Almost two-thirds of survey respondents indicated their goals for deploying solar energy technologies on city building and facilities will increase, with three in ten cities expecting deployments to increase significantly (30%) and more than one-third expecting to increase slightly (35%).

Only two cities out of 178 in the survey expect their use of solar technologies on city buildings and facilities to decrease over the next five years.

Solar Energy Deployments on City Buildings and Facilities in Next 5 Years are Expected to ...

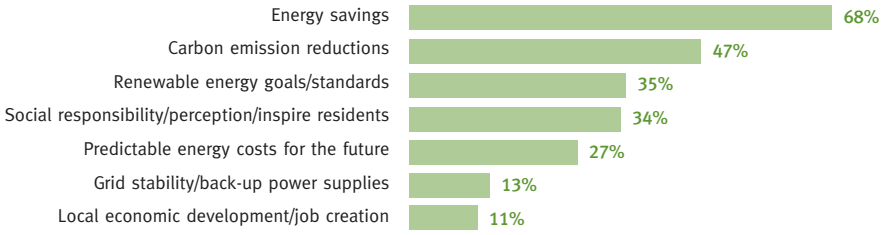
(percentage of cities)



Of the cities expecting more solar energy use on city buildings and facilities, more than two-thirds identified energy savings as the top reason for this increase. With energy savings (68%) cited most often as the reason for increased solar deployments, almost half of these cities made carbon emission reductions their second choice, followed by renewable energy goals/standards (35%).

Reasons Cities are Increasing Solar Energy Deployments

(percentage of cities)

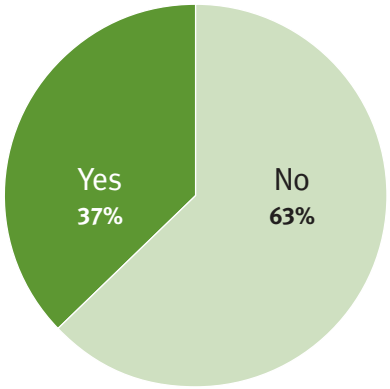


NOTE: Includes up to three responses per city.

More than one-third of all cities have a plan to install solar energy technologies on city-owned buildings and facilities. Nearly four in ten cities (37%) have a plan for installing solar technologies on their own buildings and facilities.

Share of Cities with a Plan to Install Solar Energy Technologies on City-owned Buildings and Facilities

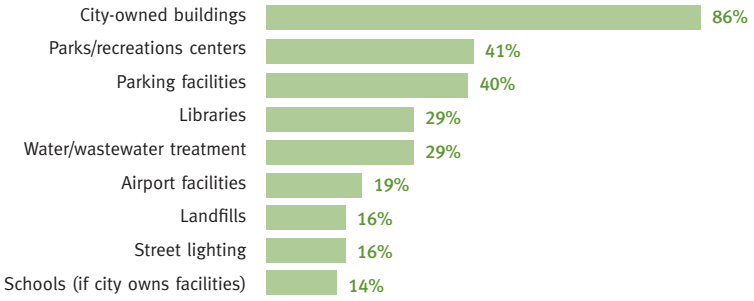
(percentage of cities)



Of the cities with a solar deployment plan, more than four in five have targeted city-owned buildings as the top area for the installation of these renewable energy technologies. Beyond the sizable majority (86%) targeting city-owned buildings for new solar installations, four in ten cities identified parks/recreation centers (41%) and parking facilities (40%) as well in their solar energy plans.

Facilities Targeted in City Solar Energy Plans

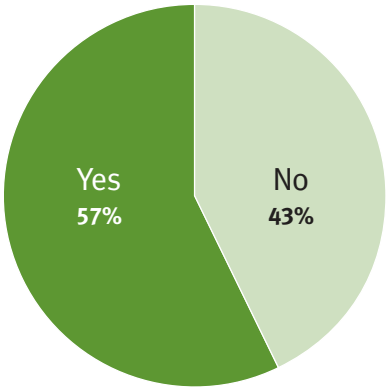
(percentage of cities)



A sizable majority of all cities have already deployed solar energy technologies on city-owned buildings and facilities. Adopted solar plans aside, all cities were asked if they had deployed solar technologies at one or more city buildings or facilities, with nearly fifty-seven percent (100 cities) responding affirmatively.

Share of Cities Previously Deploying Solar Energy on City-Owned Buildings and Facilities

(percentage of cities

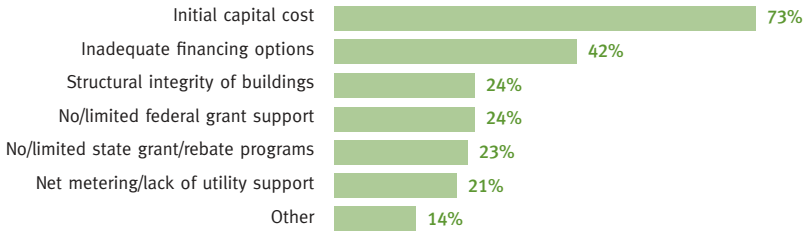


Nearly three in four cities identified initial capital costs as the "most significant" barrier to installing solar technologies on city-owned buildings and facilities. Citing initial capital costs (73%) as the most significant barrier to installing solar technologies, nearly four in ten cities (39%) also identified inadequate financing options as the second more important barrier to its use on city facilities.

Notably, four of the top five barriers cited, including no/limited federal support and no/limited sate grant/rebate programs, were financial in nature, with the exception of the structural integrity of buildings (24%).

Barriers to Deploying Solar Energy Technologies on City-Owned Buildings and Facilities

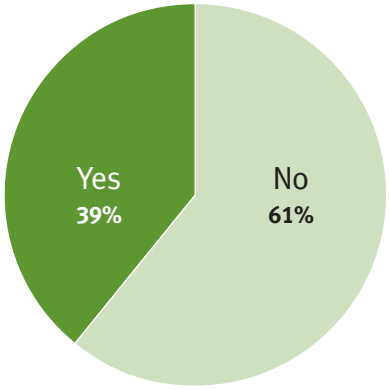
(percentage of cities)



Almost four in ten cities have a strategy to spur the installation of solar energy technologies by homeowners, businesses and other institutions. Beyond installing solar systems on city buildings and facilities, a sizable share of cities (39%) also have a strategy to spur solar energy use by homeowners, residential/commercial building owners, businesses and/or major local institutions.

Share of Cities with a Strategy to Spur the Installation of Solar Technologies by Homeowners, Businesses, Others

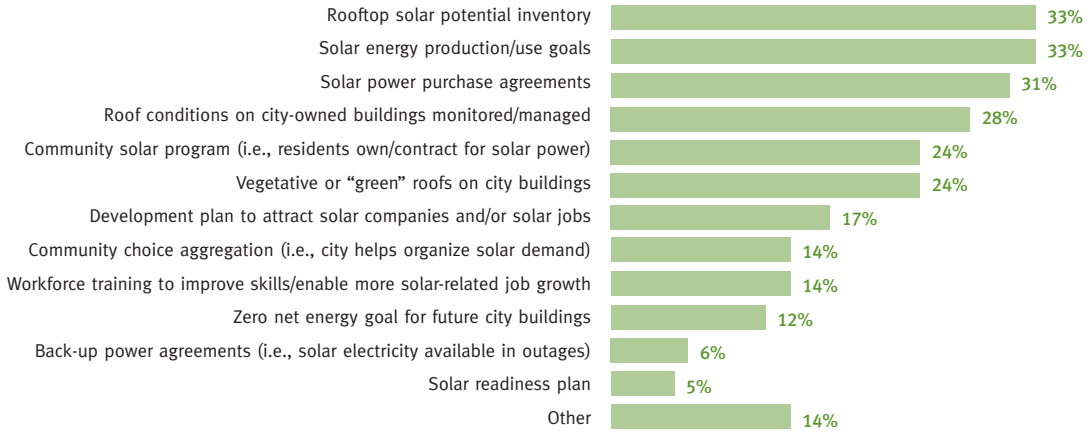
(percentage of cities)



Solar energy production/use goals and rooftop solar potential inventory are the top two solar-related practices/initiatives adopted by nearly one in three cities. When asked to identify various local actions supporting solar energy use, one-third of the respondents (33%) identified solar energy production/use goals and a rooftop solar potential inventory most often. After these top choices, solar power purchase agreements (31%) and roof conditions on city-owned building monitored/managed (29%) were the third and fourth most frequent actions, respectively, in support of solar energy use.

Solar-Related Practices/Initiatives Adopted by Cities

(percentage of cities)

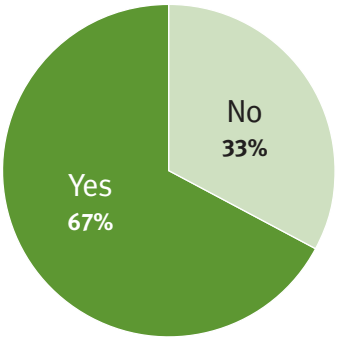


OTHER ENERGY TECHNOLOGIES/PRACTICES

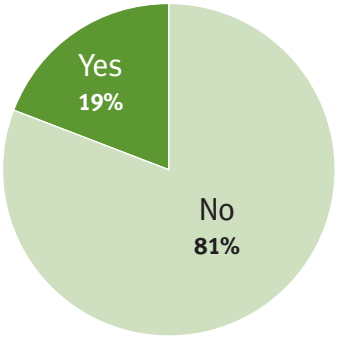
After responding to questions on building, lighting and solar technologies, cities participating in the survey were also queried on selected new technologies and energy practices.

Among these findings, two-thirds of all cities have developed or are developing infrastructure for electric vehicle (EV) use and nearly three-quarters of all cities expect to engage in more public-private partnerships over the next three years to achieve their energy and climate goals.

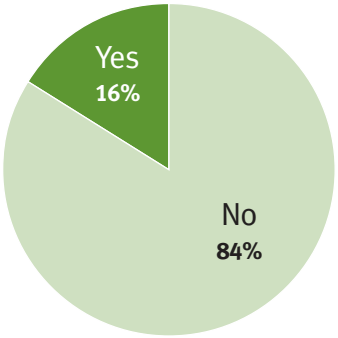
On New Technologies, Share of Cities that ...



Have developed/are developing infrastructure for electric vehicle (EV) use?

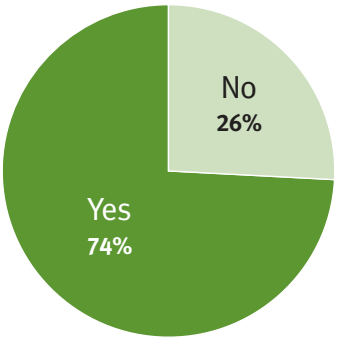


Are partnering with private sector on combined heat and power systems?

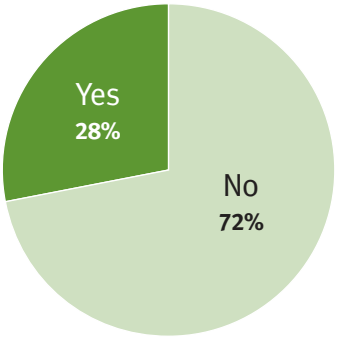


Are considering actions/reviews to support hydrogen-fuel vehicles?

On Other Practices, Share of Cities that ...



Expect to engage in more public-private partnerships over next 3 years to achieve energy and climate goals?

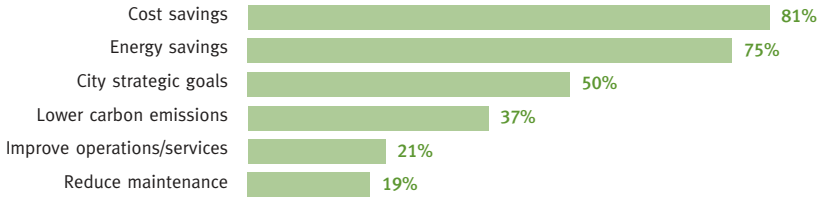


Direct part of their energy cost savings to other energy efficiency projects?

Cost savings and energy savings are the top two reasons why cities adopt and deploy new energy technologies. When asked what motivates their city to adopt and deploy new energy technologies, more than four in five cities cited cost savings (81%) and three in four cities cited energy savings (75%) as their top reasons.

Why Cities Adopt or Deploy New Energy Technologies

(percentage of cities)



NOTE: Includes up to three responses per city.

Participating Cities

Abilene, TX
Akron, OH
Alameda, CA
Albany, NY
Alexandria, LA
Alexandria, VA
Allentown, PA
Apopka, FL
Artesia, CA
Atlanta, GA
Auburn, WA
Aurora, CO
Austin, TX
Baltimore, MD
Bartlett, TN
Beaumont, TX
Beaverton, OR
Billings, MT
Blacksburg, VA
Boise, ID
Boston, MA
Buffalo, NY
Burlington, NC
Burnsville, MN
Camden, NJ
Cape Coral, FL
Carmel, IN
Carson City, NV
Casa Grande, AZ
Chapel Hill, NC
Charleston, SC
Charlotte, NC
Chattanooga, TN
Chicago, IL
Clarksville, TN
Clifton, NJ
College Park, MD
Columbia, MO
Columbia, SC
Columbus, OH
Cooper City, FL
Coral Springs, FL
Corpus Christi, TX
Costa Mesa, CA
Cutler Bay, FL
Cuyahoga Falls, OH
Dallas, TX
Dalton, GA
Davenport, IA
Dayton, OH
Denton, TX
Denver, CO
Des Moines, IA
Dubuque, IA
East Hartford, CT
East Orange, NJ
Easton, PA
Elizabeth, NJ
Eugene, OR
Evanston, IL
Everett, MA
Everett, WA
Fairbanks, AK
Fairfield, CT
Fargo, ND
Fayetteville, AR
Fort Wayne, IN
Fremont, CA
Fresno, CA
Frisco, TX
Gary, IN
Gillette, WY
Grand Rapids, MI
Greeley, CO
Gresham, OR
Hallandale beach, FL
Hanover Park, IL
Hartford, CT
Hattiesburg, MS
Hempstead, NY
Hendersonville, TN
Hillsboro, OR
Hoffman Estates, IL
Hope, NJ
Houston, TX
Independence, MO
Iowa City, IA
Irving, TX
Kansas City, KS
Kansas City, MO

Kearny, NJ
Knoxville, TN
Lake Barrington, IL
Lakeland, FL
Lambertville, NJ
Las Vegas, NV
Laurel, MD
Lima, OH
Lincoln, NE
Little Rock, AR
Long Beach, CA
Los Angeles, CA
Louisville, KY
Lynwood, CA
Mesa, AZ
Minneapolis, MN
Miramar, FL
Monroe, LA
Mooresville, NC
Mountain View, CA
New Bedford, MA
New Haven, CT
New Orleans, LA
New York, NY
Newport Beach, CA
Newton, MA
Niagara Falls, NY
Normal, IL
North Miami, FL
North Wilkesboro, NC
Oak Lawn, IL
Ontario, CA
Orlando, FL
Oro Valley, AZ
Palm Bay, FL
Palmdale, CA
Pembroke Pines, FL
Philadelphia, PA
Phoenix, AZ
Pinellas Park, FL
Piscataway, NJ
Pittsburgh, PA
Plainfield, NJ
Pompano Beach, FL
Portland, OR
Providence, RI
Redford, MI
Redmond, WA
Reno, NV
Roanoke, VA
Rochester Hills, MI
Sacramento, CA
Saint Paul, MN
Salisbury, NC
Salt Lake City, UT
San Francisco, CA
San Jose, CA
San Leandro, CA
Sandy, UT
Santa Ana, CA
Santa Barbara, CA
Santa Cruz, CA
Santa Fe, NM
Santa Monica, CA
Schaumburg, IL
Schenectady, NY
Seattle, WA
South Jordan, UT
St. Louis, MO
St. Petersburg, FL
Stamford, CT
Sumter, SC
Sunnyvale, CA
Syracuse, NY
Tampa, FL
Tempe, AZ
Toledo, OH
Torrance, CA
Turlock, CA
Urbandale, IA
Vancouver, WA
Washington, DC
West Haven, CT
West Hollywood, CA
West Sacramento, CA
Winston-Salem, NC
Woodland, CA
York, PA

ABOUT THE SURVEY

This report was prepared by The U.S. Conference of Mayors and sponsored by Philips. From December 4, 2015 through January 12, 2016, cities could complete the survey electronically, with 178 responses received by the deadline. By email, the Conference contacted nearly 1,400 mayors, most representing cities with a population of 30,000, requesting mayors to compete the survey. We would like to thank all those who participated in the survey for their efforts and timely responses.

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