



*The South-central Partnership for Energy Efficiency as a Resource*

# The Power of Benchmarking

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**Table of Contents**

Introduction ..... 1

Policy Drivers..... 4

Benchmarking Process ..... 6

Barriers and Challenges ..... 18

Lessons Learned ..... 19

Recommendations and Way Forward ..... 21

Conclusion..... 22

“You can’t manage what you don’t measure.” -- Peter Drucker



## Introduction

Building energy benchmarking is the process of tracking building energy consumption by comparing the results to similar buildings, or the same building over time. Benchmarking the energy performance of buildings is the key first step towards understanding and reducing energy consumption and building operations. Municipal governments often have large building portfolios and are faced with increasing utility costs and shrinking budgets. The U.S. Environmental Protection Agency (EPA) estimates that state and local government agencies spend more than \$10 billion a year on energy to provide public services and meet constituent needs, but nearly one-third of the energy used to run typical government buildings can be conserved. Municipalities have the unique opportunity to lead by example through benchmarking their energy use, setting energy reduction goals, improving building operations, and reducing their budgets as a result.

A study by the U.S. EPA examined data from over 35,000 buildings found that those benchmarked using their [ENERGY STAR® PortfolioManager®](#) online tool demonstrated on average 7 percent savings in energy over three years—with the initial lowest-performing buildings making the greatest improvements<sup>1</sup>. The data revealed that if all buildings in the U.S. followed a similar trend, \$4.2 billion in energy savings could be achieved in just in the first year, according to Institute of Market Transformation (IMT) calculations. EPA estimates that through 2020, the potential savings in building energy use could be approximately 25 percent on a per-building basis if the trend continues.

Ten cities, two states, and one county have adopted energy benchmarking and transparency laws requiring some sharing of the information. While each of these require building owners to track their properties' energy use, the regulations vary regarding the size and type of buildings they affect and whether the energy use data must be disclosed publicly, or just to potential tenants or buyers.<sup>2</sup>

SPEER has reviewed the current practices of the largest cities in Texas and Oklahoma and developed recommendations to enable and accelerate the adoption of municipal benchmarking. There are unique opportunities open to several cities in the region (Dallas, Fort Worth, and Houston within the scope of this paper), due to the restructured electric market in most of Texas. Restructured investor owned utilities have universal deployment of smart meters in their service territories and, as of November 2014, have enabled third party access to customer data. With city approval, third parties can now easily gain access to cities' data and provide analysis of savings opportunities looking at both historical data and current usage. They can also offer automatic updating of PortfolioManager if they can develop an API connection between the utilities' portal, [Smart Meter Texas](#), and EPA's PortfolioManager. We will be working with market participants and cities to accelerate widespread use of these services.

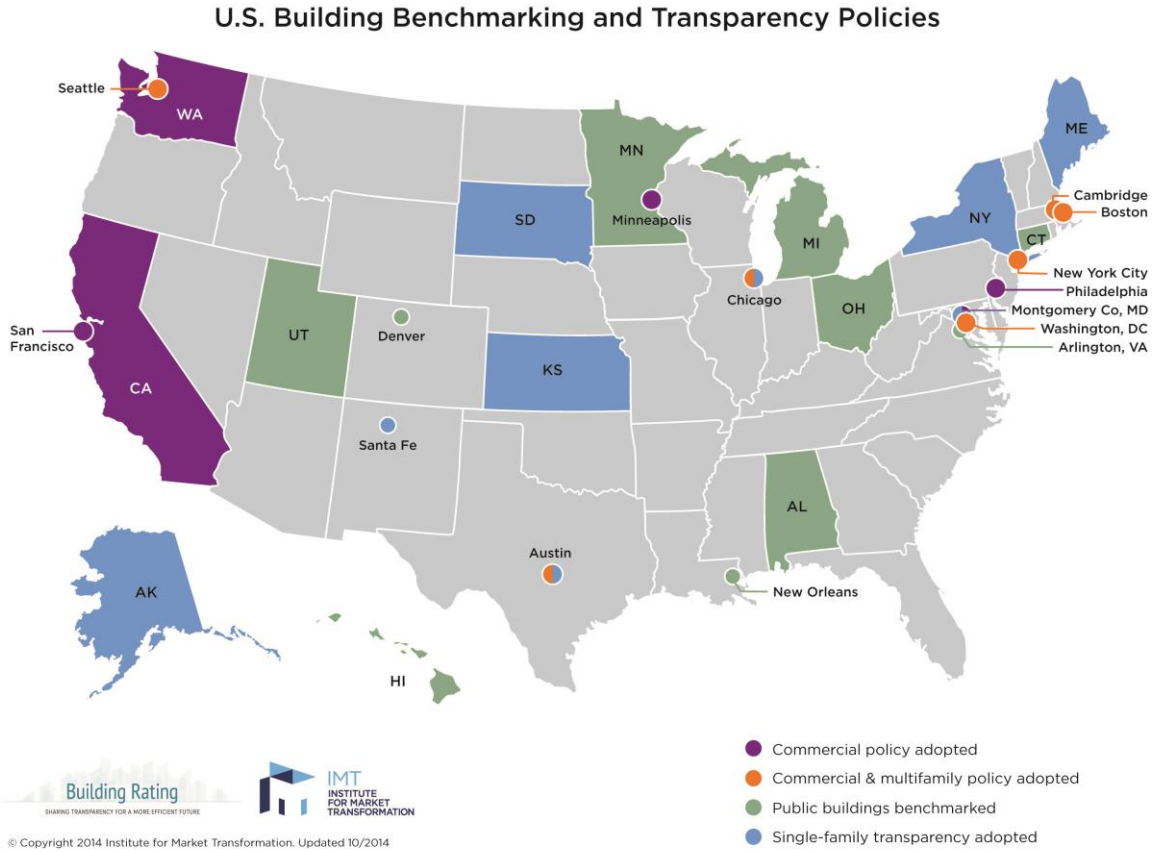
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<sup>1</sup>[http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends\\_Savings\\_20121002.pdf?3d9b-91a5](http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Savings_20121002.pdf?3d9b-91a5)

<sup>2</sup> For more details visit <http://www.buildingrating.org/graphic/us-benchmarking-policy-landscape>



Figure 1: Status of Building Benchmarking and Data Disclosure Policies in the U.S.



**Benchmarking in the SPEER Region**

In this report, we examine the status of benchmarking practices in the eight largest and fastest growing cities in Texas and Oklahoma. See the table below for a list of cities.

**Table 1: List of Cities Surveyed by SPEER**

State	City	Population ( 2013)	Population percent change (2010 to 2013)	Land Area in Sq. Mile (2010)
Texas	Houston	2,195,914	4.70%	599.6
Texas	Austin	885,400	9.20%	297.9
Texas	Dallas	1,257,676	5.00%	340.5
Texas	San Antonio	1,409,019	6.10%	460.9
Texas	El Paso	674,733	3.90%	255.2
Texas	Fort Worth	792,727	6.80%	339.8
Oklahoma	Oklahoma City	610,613	5.30%	606.4
Oklahoma	Tulsa	398,121	1.60%	196.8



## Policy Drivers

The states of Texas and Oklahoma are committed to increasing energy efficiency in public buildings through policies adopted in both states that are driving the adoption of benchmarking practices in this region.

Texas first took legislative action in 2001, requiring municipal buildings to make 5% energy reductions annually; the initial policy has been revised and updated many times. The most current statute which impacts municipal energy performance improvements and benchmarking was enacted in 2011 in SB 898<sup>3</sup> which extended the energy reduction goal of 5% annually for an additional 10 years. SB 898 also requires local governments to report the progress toward the goal to the State Energy Conservation Office (SECO). The reporting requirement began in September 2011 and benchmarking is key to demonstrating compliance with this legislation.<sup>4</sup> Texas also has energy reporting mandates for other organizations such as, institutes of higher education, state agencies, and schools. A complete list of the current Texas' energy reporting mandates is available on the [SECO website](#).

In 2012, S.B. 1096 established the Oklahoma State Facilities Energy Conservation Program and directs all state agencies and higher education institutions to achieve cumulative energy savings of at least 20 percent by the year 2020 when compared to fiscal year 2012 utility expenditures. All state agencies are required to input historical utility costs into ENERGY STAR PortfolioManager on a monthly basis and deliver an annual report on the progress and cost savings of the program to the director within 90 days after the end of each fiscal year. The state Finance Director oversees the development and implementation of the energy conservation program. All costs associated with the implementation are to be fully funded by savings generated as a result of energy conservation. While, this requirement is not applicable to local governments and municipalities; Oklahoma City has made its own voluntary commitment to the S.B. 1096 initiative and started benchmarking its building portfolio.

Most of the cities interviewed in Texas and Oklahoma have put in place a Sustainability Action Plan or a Climate Action Plan for city operations. These Action Plans identify energy reduction goals for the cities and include building energy performance benchmarking and/or disclosure programs as strategic priorities for most cities. The city of Austin has demonstrated leadership and has adopted a mandatory benchmarking and disclosure ordinance for all buildings in the city, currently the only city with a mandatory disclosure ordinance. Austin adopted the Energy Conservation Audit & Disclosure (ECAD) ordinance in 2009<sup>5</sup> to facilitate energy improvements in existing homes and commercial buildings. The

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<sup>3</sup> Previously- The [Senate Bill 5 \(SB5\)](#), also known as the [Texas Emissions Reduction Plan](#) and the [Senate Bill 12 \(SB12\)](#) have laid down requirements for energy consumption reduction in Texas. S.B. 700 lays down energy, water and natural gas reduction requirements for state agencies and institutes for higher education.

<sup>4</sup> . Further information can be found on SECO's Non-Attainment Area Energy Reporting page. Available at <http://www.seco.cpa.state.tx.us/energy-reporting/non-attainment.php>

<sup>5</sup> and amended as City of Austin [Ordinance No. 20110421-002](#) in April 2011,



ordinance requires commercial building<sup>6</sup> owners that are served by Austin Energy to submit an energy benchmark rating for their facilities. In addition, ECAD requires residential properties to undergo energy audits before the sale of the property. The building rating and disclosure ordinance does not require that owners implement energy efficiency upgrades and instead focuses on providing better information on energy use to owners, tenants, and buyers.

Other cities have policies and/or programs which drive their energy conservation and benchmarking activities in other ways. For example, the City of San Antonio' adoption of the [Mission Verde Sustainability Plan](#) in 2010 set a goal for the city to retrofit all municipal buildings by 2015 and focused attention on the need to benchmark buildings as the first step. Three cities (Houston, Fort Worth, and El Paso) are focusing on benchmarking after participation in the [U.S. Department of Energy's \(DOE\) Better Buildings Challenge \(BBC\)](#) which mandates benchmarking and reporting energy performance metrics. Other noteworthy programs or policies driving benchmarking initiatives include the City of Houston's participation in the [City Energy Project](#), Fort Worth's [Resource Conservation Program](#), and participation of Austin, Dallas, El Paso, Fort Worth and San Antonio in the [U.S. Conference of Mayors \(COM\) Climate Protection Agreement](#). Several cities (El Paso, Fort Worth, and Houston) also use benchmarking as a way to measure their savings resulting from Energy Service Performance Contract (ESPC) agreements with service providers.

**Table 2: Select Policy and Programmatic Drivers for Building Energy Performance Benchmarking**

City	Policy / Programmatic Drivers	Year	Policy Goals
Houston, TX	Houston Green Office Challenge (HGOC)	2011	20% reduction in Energy Intensity by 2020 (for Better Buildings Challenge only)
	DOE Better Building Challenge	2011	
	The City Energy Project	2014	
Austin, TX	Climate Protection Plan	2007	Achieve 800 MW of peak demand savings through energy efficiency and demand-side; Net-zero community wide greenhouse gas emissions by 2050
	Energy Conservation Audit & Disclosure (ECAD) Ordinance	2009	
Dallas, TX	U.S. Mayors Climate Change Agreement Forward Dallas Comprehensive Plan	2006	Reduce greenhouse gas emissions 33% below 1990 levels by 2020
San Antonio, TX	Mission Verde Sustainability Plan	2010	Retrofit all municipal buildings by 2015

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<sup>6</sup>Exempts manufacturing buildings. More information available on <http://www.austinenergy.com/wps/wcm/connect/b96a04df-f119-437a-af43-f38b2e40d0d3/ecadCommercial.pdf?MOD=AJPERES>



City	Policy / Programmatic Drivers	Year	Policy Goals
El Paso, TX	Liveable City Sustainability Plan	2009	Reduce the City's energy consumption by 30% below 2008 levels by 2014
	DOE Better Building Challenge	2012	
	EL Paso Energy Savings Challenge	2012	
	El Paso Green Business ChallengeEnergy Service Performance Contract (ESPC)	2012	
Fort Worth, TX	City Secretary Contract: ESPC	2003	Texas S.B.5 <sup>h</sup> Compliance; Climate Protection Agreement; Energy Efficiency & Conservation Block Grant; Texas S.B.898 Compliance; BBC Community Partner Agreement
	City Resolution: U.S.COM	2007	
	City Ordinance: U.S.DOE	2009	
	City Resolution: State of Texas	2012	
	City Resolution: U.S.DOE	2012	
Oklahoma City, OK	Voluntary Commitment	2010	
Tulsa, OK	City of Tulsa Sustainability Plan	2011	No quantitative goal yet, but identifies energy innovation as a strategic priority and commits to reducing energy usage and costs in public buildings through the application of emerging energy technologies and energy auditing.

### Benchmarking Process

Seven cities currently have benchmarking practices in place. The city of Tulsa is the only exception which is yet to start benchmarking its building portfolio, but is interested in moving towards adopting the practice in the coming years. The process of building energy performance requires the collection of building characteristics, asset information, and the energy consumption data. The building information is usually collected from various departments within the city and the energy consumption data is provided by the utility companies and/or aggregated from the utility bills that are sent to the city. The table below provides the names of the electric, gas and water utility providers for the eight cities examined.

The process of collecting and compiling the information needed to benchmark electric consumption is not easy and there are several methods that are being used at this time, by the cities we interviewed. A commonly used method is the manual entry of utility bills through which a city staff member looks at bills (paper or electronic) and collects consumption data for individual meters. This meter level consumption data is then aggregated to the building level and uploaded into a benchmarking tool.



**Table 3: Utility Companies for Selected Cities**

CITY	ELECTRICITY	NATURAL GAS	WATER
Houston, TX	Reliant Energy (REP) CenterPoint Energy (TDU/IOU)	CenterPoint Energy	City of Houston
Austin, TX	Austin Energy	Texas Gas	City of Austin
Dallas, TX	Reliant Energy (REP) Oncor Electric Delivery (TDU/IOU)	Atmos Energy Corp.	Dallas Water Utilities
San Antonio, TX	CPS Energy	CPS Energy	San Antonio Water System
El Paso, TX	El Paso Electric	Texas Gas Service	El Paso Water Utility
Fort Worth, TX	Texas General Land Office/Cavallo (REP); Oncor Electric Delivery (TDU/IOU)	Atmos Energy Corp.	City of Fort Worth, Water Department
Oklahoma City, OK	Oklahoma Gas & Electric and some smaller Cooperative utilities	Oklahoma Natural Gas	Oklahoma City Water and Waste
Tulsa, OK	Public Service Company of Oklahoma	Oklahoma Natural Gas	City of Tulsa

CPS Energy is assisting the city of San Antonio's benchmarking efforts by providing all electric meter level consumption data on a single spreadsheet. This makes it easier for the city to aggregate building level consumption before entering it into a benchmarking tool. There are also third party providers which offer services to cities that include data collection, aggregation, benchmarking and analysis. The use of third party services can be an effective option for cities which have limited human resources to initiate a benchmarking or energy efficiency program. Finally, there are two other mechanisms being used in the building industry but are not available for use in Texas or Oklahoma. Some utilities across the country are offering their customers access to aggregated building level energy consumption data and/or offering services through which consumption data can be automatically uploaded to PortfolioManager for benchmarking.





**Table 4: Energy Data Collection Practices**


Access Type	Description	City Name
Manual Entry of Paper/Online Bills	Staff collects energy consumption information from a utility bill for each meter which is then manually aggregated to the building level and entered into a benchmarking tool	Austin, Dallas, El Paso, Fort Worth, Houston
Electronic Billing Entry	Utility provides energy consumption information from multiple meters in a spreadsheet and provides that information to the city on a regular basis	Fort Worth, San Antonio
Third Party Services	A service provider aggregates utility bill data for their accounts on behalf of the city	Dallas, Fort Worth, San Antonio, Oklahoma City
Aggregated Billing	Utility provides building level consolidated energy consumption data to the building owner while maintaining confidentiality of individual users or tenants	None in Texas or Oklahoma
Automatic data upload	A software solution that compiles the aggregate data in a way that can automatically populate PortfolioManager and update the account on a regular basis.	None in Texas or Oklahoma

**Benchmarking Success Stories**

**Houston, TX:** The City of Houston is actively working to benchmark energy performance for all city-owned facilities, which accounts for almost 23 million square feet of building space spread across 400 properties.<sup>7</sup> The city sustainability team gathers the building energy use and asset information and uses the PortfolioManager tool for its benchmarking program. The city started its benchmarking efforts in 2011, and currently has about 400 buildings and almost 10 millions square feet of building space benchmarked. The sustainability team gathers the data using a variety of resources and methods, while taking advantage of support from fellow city departments. Reliant Energy and CenterPoint Energy compile the meter level consumption data for the city through SAP Data Integrator software and upload it. The city's Finance Department downloads this data, converts it to excel format and sends it to the sustainability team who aggregate the data up to the building level. The operating hours come from the various departments: the age of building, square footage and date of ownership from the General Services and Administration & Regulatory Affairs Department, and building occupancy data from Human Resources. For facilities without readily available square footage, the sustainability team uses Google Earth to approximate the square footage. When this method is used, the city flags that property to note

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<sup>7</sup> This includes every metered building in the city portfolio, excluding the airport system and Houston



that future verification of this information is needed. The team also works with department representatives to provide data such as occupancy hours and number of occupants. In cases when the detailed data is simply not available, the city uses the PortfolioManager default values.

The sustainability team has been able to gather and upload energy consumption data back to year 2008. New utility data is uploaded to PortfolioManager twice a year and the city is expected to move to quarterly uploads by the end of 2015. The staff inspects outliers during the manual data entry process, and utilizes PortfolioManager's Data Quality Checker to determine if data is missing or to further identify irregularities. PortfolioManager's reports regarding site and source Energy Use Intensity (EUI) are reviewed to identify any significant changes that could be anomalies. Finally, the city works with the Department of Energy to validate its data for the buildings participating in the Better Building Challenge (BBC). The city uses the benchmarked data to identify any operational anomalies, prioritize buildings for energy retrofits; track progress of energy retrofit projects; monitor their ESPCs and develop city building energy report cards for the City Green Teams.

The city of Houston is committed to move towards the public disclosure of building energy performance of all buildings in their portfolio. On November 19, 2014, the city of Houston demonstrated its leadership by publicly releasing performance data for all municipal facilities larger than 25,000 square feet. This release consisted of 62 city-owned buildings representing more than 5 million square feet of space, and the site EUI data, based on 2013 data, for each building is now available to the public online via an interactive portal.<sup>8</sup> Through this portal, community members can also find information about the PortfolioManager tool, learn how energy efficiency initiatives can pay off with lower energy costs, and gain access to resources and training.


The city and Reliant Energy are also participating in DOE's [Better Buildings Energy Data Accelerator Program](#) and have committed to demonstrate streamlined, best-practice approaches for building owners to access whole-building energy usage data for the purpose of benchmarking and achieving greater energy and cost savings. Houston's participation in [The City Energy Project](#)<sup>9</sup> which was launched in 2014, is also working towards streamlining and strengthening its benchmarking processes and moving towards a multi-account aggregated data upload to PortfolioManager in the future.

**Austin, TX:** The city has 192 buildings in its portfolio that span a total area of 8.96 million square feet. Only 106 buildings in the city's portfolio are over 10,000 square feet and are mandated to comply with the Energy Conservation Audit and Disclosure (ECAD) ordinance. As of February 4, 2015, the city has completed benchmarking energy performance in 99 (or 93%) of those 106 buildings. The Office of Sustainability is responsible for overseeing the city's municipal benchmarking efforts, but the individual municipal departments are benchmarking their own buildings using energy consumption data provided

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<sup>8</sup> <http://houstoncityenergyproject.org/about/leading-by-example/>

<sup>9</sup> A joint initiative of the Natural Resources Defense Council and the Institute for Market Transformation, the City Energy Project is generously supported by Bloomberg Philanthropies, Doris Duke Charitable Foundation, and The Kresge Foundation.




in the utility bills and building asset data available in their own operational records. If needed, Austin Energy and the Sustainability Office provide technical assistance and training for benchmarking to their various departments. The city of Austin and Austin Energy are also participants in DOE's Better Buildings Energy Data Accelerator program and are exploring ways to improve whole-building energy usage data access for its customers for the purpose of benchmarking and maximizing savings. They also have installed sub-meters in some buildings to obtain more granular, real-time data.

[The Energy Conservation Audit and Disclosure \(ECAD\)](#) program was initiated in 2009 and amended in April 2011. The ECAD program is one of the programs that was initiated to contribute to the CO<sub>2</sub> emission reduction goal of the city's 2007 Climate Protection Plan. ECAD was specifically designed to provide more information to building owners, tenants, and buyers, to motivate retrofits of existing buildings, and help to drive more participation in their various energy efficiency incentive programs. The ordinance applies to all buildings: single-family, multi-family, and commercial buildings, unless exempt. Exemptions include properties less than ten years old, properties that have recently made significant energy efficiency improvements; low income properties qualified for free weatherization, properties in probate or ownership changes, manufactured housing, and commercial facilities that receive a Texas Sales Tax Exemption.

The ECAD program is implemented by Austin Energy, the municipal electric utility. The program used a tiered approach to roll out this new program, with the largest buildings required to report first, to disclose building energy performance to the utility. All commercial properties that are 10,000 square feet or larger are required to benchmark their energy performance annually using PortfolioManager. Commercial energy ratings are translated into a single number, ranging from 1 to 100, with 50 indicating the average energy use for other buildings of the same building type. The rating is coupled with recommended voluntary goals to help interpret the rating: "no action necessary" for ratings 75 and above; "raise score to at least 75" for ratings 63-74; "raise the score by 20%" for ratings 42- 62; and "raise score to 50" for ratings below 42. The benchmarking result for commercial buildings could be a site EUI instead of a rating score. The ECAD ordinance mandates commercial building owners to track all fuel types, with tracking of water consumption still optional. Residential information from a customized energy audit is shared with potential buyers at the point of sale, to encourage investment in energy efficiency; however the conversion of this "information to action" has not been as high as hoped. Tenants are also provided building EUI information which scores the building in comparison with other similar buildings, also with the intention of encouraging tenants or apartment renters to shop around for more efficient properties; however the current rental market is at about 97% occupancy, so it is hard to see any effect this is having at this time.

The city initially witnessed a high rate of compliance with the large commercial buildings, but fewer buildings have been reporting their energy performance on an annual basis. The city is now working to reach out to those owners to encourage updating their information. The smaller commercial buildings (between 10,000 - 30,000 square feet) are proving to be more challenging, as few of these small




businesses have the personnel to use PortfolioManager to report their EUI. The city is considering making the reporting simpler, and may have the utility provide them EUI based on billing history, along with individualized recommendations. The city primarily uses the benchmarked data to demonstrate compliance with ECAD, prioritize investments, and seek recognition for high performing buildings.

**Dallas, TX:** The city of Dallas has benchmarked approximately 20% of its building portfolio which comprises of 400 buildings that cover over 10 million square feet. The city is benchmarking its buildings to respond to energy reduction goals set forth by the [ForwardDallas! Comprehensive Plan](#). The Energy Manager is responsible for the benchmarking efforts and for overseeing any Energy Performance Savings Contract (ESPC) projects. The city just started using ENERGY STAR PortfolioManager in 2014 and is currently entering building asset data and energy consumption information into the tool manually. They would like to move towards a more automated system in the future and take advantage of the Green Button and Electronic Data Interchange (EDI) capabilities that are available through TXU Energy. Dallas is currently leveraging its benchmarked data to track savings made under its ESPC and to prioritize investments. Dallas also wants to eventually use the benchmarked data to initiate an energy performance competition between buildings of a similar building type in order to encourage energy conservation behavior and encourage implementation of efficiency projects.

The City of Dallas is also participating as a member in the development of the Dallas 2030 District. The District is a public-private partnership of building owners, managers and community stakeholders in downtown Dallas who pledge collectively to achieve carbon neutrality by 2030 through reductions in energy, water and transportation resource consumption. The 2030 District members will demonstrate progress towards their common goal by benchmarking their baseline performance and tracking their savings collectively.

**San Antonio, TX:** The city of San Antonio's building portfolio comprises of 350 buildings that it owns and operates, with 13.9 million square feet. Currently, the city has completed benchmarking 97% of its energy use (electricity, natural gas, steam and chilled water) from 276 facilities and campuses. [San Antonio's Mission Verde Sustainability Plan](#) includes a goal to retrofit all municipal buildings by 2015. The City's Office of Sustainability staff manages the on-going Municipal Retrofit Program for energy and water efficiency improvements. The city dedicated two full-time staff to manage these projects, and perform measurement and verification of savings from these energy efficiency improvement projects. In 2011, the city collected data from multiple departments such as Human Resources (occupancy and hours of operations), IT Department (for computers and equipment data), and designed data collection spreadsheet templates to facilitate data transfer from the utilities. The utility provides the meter level consumption data for all accounts to the city in a excel spreadsheet format. The Office of Sustainability staff aggregates the consumption data to the building level, collect the building asset data and upload the spreadsheet to PortfolioManager on a monthly basis. The city tracks and reviews the data in PortfolioManager on an almost daily basis and uses the data for a variety of purposes, including identification of anomalies in the utility billing data, prioritization of energy



efficiency investment projects, certification for ENERGY STAR or Leadership in Energy & Environmental Design (LEED), and demonstrating energy conservation progress to the State Energy Conservation Office (SECO) in compliance with the Senate Bill 898. CPS Energy is currently in the process of rolling out smart meters to its customers, and the city is committed to working collaboratively with the utility find solutions to use smart data to expedite the benchmarking process for the city. The city is also participating in the development of the San Antonio 2030 District which will be another platform through which the city demonstrates its commitment to energy performance benchmarking and conservation.

**El Paso, TX:** The city of El Paso has a municipal building portfolio of approximately 200 buildings that cover a total area of 3.2 million square feet. The city's benchmarking efforts are driven by its commitment of 2.5 million square feet under the [Better Buildings Challenge](#) (BBC). Benchmarking is part of the measurement and verification requirements under their Energy Savings Performance Contract (ESPC) to upgrade city facilities, traffic signals, and street lights. The city's Sustainability Office dedicates 1.5 full-time employees for the data collection and benchmarking activities. The city uses the PortfolioManager for benchmarking and has tracked electricity consumption, and now is starting to benchmark gas and water consumption, too. The energy consumption data comes from utility paper bills and the city gets other building asset information such as the building age, size, and occupancy from the Facilities and Fleet Departments. There are some buildings such as the El Paso International Airport and the city's Visitors Center that manage their own records and share the building asset and energy consumption data with the Sustainability Office. The city is using benchmarked data for prioritizing projects for future energy efficiency upgrades projects, conducting verification of savings on their performance contracts, and for tracking progress on its commitments made under the BBC.

**Fort Worth, TX:** The city of Fort Worth is currently benchmarking the electricity, natural gas, and water consumption of 101 of their facilities that total 5.7 million square feet using utility data. This is as required under the City's commitment as a [Better Buildings Challenge Community Partner Agreement](#) (BBC) with the DOE. The city's entire building portfolio includes approximately 900 facilities of over 10 million square feet. The Conservation Specialist within the city's Transportation & Public Works' Facilities Management Division is responsible for the city's benchmarking effort and the Fort Worth BBC commitments as part of that division's Resource Conservation Program. An Energy Service Company (ESCO) utilizes Metrix 4 Utility Accounting System software<sup>10</sup> in the benchmarking of facilities during development of performance contract projects. Metrix 4 is also used by the ESCO to provide the required savings reporting which supports the guaranteed project performance after construction.

With funding from the American Recovery and Reinvestment Act of 2009 (ARRA), under its Energy Efficiency & Conservation Block Grant, the city contracted its ESCO to transfer its performance contract Metrix 4 files into PortfolioManager. This was done so that the city could more readily develop and

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<sup>10</sup> <http://www.abraxasenergy.com/utility-bill-accounting-software/metrix/>



track future Resource Conservation Program projects, and as a way to quantify the ESCO's performance reporting. This allows the Conservation Specialist to use PortfolioManager as a management tool and as a reporting tool to satisfy its BBC commitment.

The Conservation Specialist obtains utility data from a variety of sources. The Retail Electricity Provider (REP) provides utility account data for all electricity meters under their contract. The city's Accounting Division has the non-REP electricity and natural gas account data, while the city Water Division has facility water account data. The Conservation Specialist obtains account data for the current month and two previous billing cycles to identify any data anomalies and inconsistencies, and utilizes Geographical Information System (GIS) technology to cross-reference utility meters to facility addresses to avoid errors in data assignment. The Conservation Specialist manually transfers this information into a spreadsheet and uploads it into PortfolioManager. Benchmarking helps the city to identify and prioritize retrofit projects, track savings of projects implemented, track progress in meeting policy goals, encourage performance based competition amongst similar building types, and identify problems with building utility accounts.

**Oklahoma City, OK:** Oklahoma City has adopted an internal energy policy for city operations that does recommend benchmark reporting. The city currently has 90% of its building portfolio of approximately 300+ buildings spanning 6 million square feet.

The benchmarking efforts are being headed by the Office of Sustainability under the City Manager with two full time staff members working to track building energy use. The Office of Sustainability at the city is currently tracking electricity and natural gas, along with some usage of steam and water usage for their buildings using the Energy Cap<sup>11</sup> software. Most of the electric and gas consumption information is provided to the city by their utilities in an electronic format. The data is then inputted into Energy Cap for benchmarking. The city also has some smaller accounts which are serviced by local cooperative utilities. The consumption data for these accounts is not available electronically and is manually entered by their contractor. The city also uses the software for energy accounting, analyzing energy tariffs, fees, power factors (PF) and other data related to energy usage and costs in city facilities. The benchmarked data and other information provided by Energy Cap are used to prioritize energy savings projects they recommend to the city management. The process of energy accounting and benchmarking has also been useful in highlighting billing and accounting discrepancies, identifying saving opportunities, and for demonstrating savings achieved by municipal building upgrades.

**Tulsa, OK:** The city of Tulsa currently does not have a benchmarking program and is not currently tracking energy performance of its portfolio of 400+ buildings. The low energy prices in Oklahoma,

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<sup>11</sup><http://www.energycap.com/>



limited staff resources, and competing priorities in the city have been barriers in implementing municipal benchmarking efforts. The city had made some effort to collect building energy performance data in 2011 for 200 of its largest buildings that account for approximately 98% of its energy use, but that effort was subsequently abandoned. In 2011, the city's benchmarking activities were spearheaded by the Office of Sustainability which is directed by the Mayor's office and they would like to re-initiate its efforts to benchmark the city's building energy use. The staff reported that data collection from the utilities and the various departments within the city was also a significant challenge as they began their benchmarking activities.

Table 5: Summary of Municipal Benchmarking Practices in Texas and Oklahoma

CITY	BENCHMARKING PORTFOLIO (Y/N)	YEAR STARTED	PERCENT COMPLETE	NO. OF BUILDINGS	PORTFOLIO SIZE (Million Sq.Ft)	ENERGY EFFICIENCY GOALS	FUELS BENCHMARKED	DATA COLLECTION PROCESS	TOOL USED
Houston, TX	Yes	2011	100%	400	23	Yes	Electricity, Natural Gas and Water	Electronic Billing Entry	ENERGY STAR PortfolioManager
Austin, TX	Yes	2009	94% *	192	8.96	Yes	Electricity, Natural Gas, Steam, Chilled Water and On-site renewable	Manual	ENERGY STAR PortfolioManager
Dallas, TX	Yes	2014	25%	400	10	Yes	Electricity & Natural Gas	Manual/ Third Party Services	ENERGY STAR PortfolioManager
San Antonio, TX	Yes	2011	97%	350	13.9	Yes	Electricity, natural gas, steam and chilled water	Electronic Billing Entry	ENERGY STAR PortfolioManager
El Paso, TX	Yes	2007	90%	200	3.2	Yes	Electricity (Starting water and gas)	Manual	ENERGY STAR PortfolioManager





CITY	BENCHMARKING PORTFOLIO (Y/N)	YEAR STARTED	PERCENT COMPLETE	NO. OF BUILDINGS	PORTFOLIO SIZE (Million Sq.Ft)	ENERGY EFFICIENCY GOALS	FUELS BENCHMARKED	DATA COLLECTION PROCESS	TOOL USED
Fort Worth, TX	Yes	2009	60%	900	10	Yes	Electricity & Natural Gas	Manual/Third-Party Services	Metrix 4 (ESPC); PortfolioManager (BBC)
Oklahoma City, OK	Yes	2010	90%	300	6	No	Electricity and Natural Gas and early stages of steam and water	Manual/ Third Party Services	EnergyCap

\* 99 of the 106 buildings that are larger than 10,000 square feet and need to comply with ECAD

**Table 6: Applications of Benchmarking Data in Texas and Oklahoma**

<b>CITY</b>	<b>Municipal Mandate</b>	<b>Better Buildings Challenge</b>	<b>ESPC Requirement</b>	<b>Building Certifications</b>	<b>Prioritize and/or Monitor EE Investments</b>	<b>Energy Performance Competition Among Buildings</b>	<b>Improve Building Operation and Maintenance</b>
Houston, TX		√	√	√	√	√	√
Austin, TX	√			√	√		
Dallas, TX			√	√	√	√	√
San Antonio, TX				√	√	√	√
El Paso, TX		√	√		√	√	
Fort Worth, TX		√	√		√	√	√
Oklahoma City, OK					√		√




## Barriers and Challenges

All the eight cities surveyed realize the value proposition of benchmarking their building portfolios and all their staff would like to expand their current activities to include all of their municipal buildings, and be able to track all energy, transportation fuels, and water use. They would like to increase the frequency of updating their data and the ability to routinely evaluate building operations, energy performance and associated savings. However, the cities face some challenges which are currently limiting their ability to expand their benchmarking efforts. These challenges and barriers include the following:

- There is no standardized process or identified best practice for benchmarking. The lack of technical guidance on the process of initiating a benchmarking program is a significant challenge in new jurisdictions committing to benchmarking and inhibits the ability of cities with existing programs to optimize their operations.
- There are some barriers and challenges regarding data access for customers in Texas. For instance, in deregulated areas of the state of Texas, the electric utilities are prohibited from providing “services” to their customers. Utilities will often refer cities to their retail electric providers (REP), who sometimes require payment to provide certain data services, such as aggregation of meter data, or providing whole building data. The utilities created the platform called Smart Meter Texas which allows access to energy consumption data by customers, or by third-party service providers with customer agreement (third party access was just made available last November). These providers are now developing ways to access this system and meet customer needs, but customers don't typically know third party services are available. The deregulated market provides benefits, but sometimes cities are caught in a kind of limbo, unsure who can help them manage and use their data.
- There is sometimes a lack of communication and collaboration between the cities and their municipal utility companies which could streamline their energy data collection.
- The process of collecting disaggregated building asset information which is often spread across multiple departments<sup>12</sup> within the city can be very time consuming.
- The benchmarking activities are often limited by the lack of staff and resources dedicated to this effort. As a result, benchmarking is often done sporadically with utilization of temporary staff or interns. There is a need for allocating budgets and resources to hire or contract with trained and

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<sup>12</sup> For example, The City of Oklahoma has to coordinate between fourteen different departments in order to get all the needed data for benchmarking. These departments include Development Services, Non-Departmental/Finance, COTPA, General Services, IT, Fire, Police, Parks and Recreation, Public Works, and three utilities (Solid Waste, Water, Wastewater)




qualified personnel, track building performance improvements and identify both consumption and cost saving opportunities on a continuous basis.

- There are additional challenges involved in tenant occupied buildings related to data access of utility and building asset data. There is a need for the development of policies, programs and tools which can facilitate the data access and allow building owners to take a comprehensive look at their portfolios (e.g. Green Leases, Green Button).

### Lessons Learned

- Benefits of Benchmarking: The process of reviewing, analyzing and tracking building energy performance data yields many benefits. There are financial benefits of benchmarking which include reduced energy use and costs. The process of benchmarking also allows cities to take a closer look at the energy billing data and building operations and maintenance protocols. The regular examination of energy and cost consumption data provides an opportunity to identify and rectify billing and operational anomalies to ensure that the buildings are performing at an optimal level. Benchmarking practices can help the building community maximize their energy savings potential and result in considerable long term environmental benefits such as lowering energy use, reducing harmful emissions, supporting sustainability and minimizing impact of new development. The energy efficiency and building upgrade projects that are identified through benchmarking initiatives also spur economic development and stimulate local job growth.
- Need for Policy/Programmatic Drivers: Many cities initiate benchmarking programs due to a legislative mandate or requirements set forth under a local policy or a program that has been adopted. This indicates the key role of policy planning towards promoting energy efficiency in the building sector. This work also highlights the need that policy development needs to be complimented by enforcement mechanisms and implementation assistance to the affected parties. The low rates of compliance with SB 898 and with Austin's ECAD program suggest that lack of enforcement mechanisms can limit the impacts of policies and programs. In addition, stakeholders need technical guidance, education, access to financing, and other resources to be able to successfully comply with new policies and programs. Many cities surveyed under this project report that the lack of human and capital resources limit them from expanding or paying focused attention to their benchmarking program. In addition, the lack of enforcement mechanisms and non-compliance of their peers to state and local ordinances provides them no incentive to strive to be stay in compliance with the current legislative requirements.
- Need for Data Transparency and Public Disclosure: The cities should leverage their benchmarked data to publicly demonstrate energy and cost savings achieved and showcase the value of energy efficiency investments to their communities. Building owners can track and demonstrate savings yielded from energy efficiency investments by comparing benchmarked data of buildings before and after an efficiency improvement is made. The public disclosure of benchmarked data




and benefits of energy efficiency investments will help organizations make a strong business case in favor of additional building retrofits and help them in allocating budgets for future building efficiency upgrades. Public disclosure of benchmarked energy performance can also encourage the building community to take a closer look at opportunities to curtail consumption and improve performance. The City of Houston is publicly disclosing energy performance benchmarked data for its largest buildings and also making data on the aggregated energy and cost savings achieved and investments made available through their City Energy Project. This data disclosure practice increases the accountability for the city staff, demonstrates fiscal responsibility to the citizens, and provides examples of the financial savings opportunities of energy efficiency.

- Need for Innovative Municipal Financial Accounting Systems: Cities should leverage the savings demonstrated through benchmarked data and find innovative changes to their financial accounting systems which allow for the energy and cost savings captured through building retrofits to be channeled into future energy conservation initiatives. The city of San Antonio has established a Revolving Energy Efficiency Fund<sup>13</sup> to help the city reduce its \$34 million per year utility budget through energy efficiency retrofits at its facilities. With this fund, the city is working to do a comprehensive retrofit of all city facilities where it is economically feasible to do so. The city self-manages all of these retrofits from project design through close-out and measurement and verification of energy savings. As savings are realized in each project, or rebates received from the utility, the savings are returned back to the fund to be used in future projects. Similarly, in 2008, the city of Fort Worth established a Conservation Reserve Account within its Special Trust Fund. This account is funded by revenue to the city from incentives secured through participation in utility efficiency programs. Currently this account funds the Conservation Specialist position, the city's BBC efforts, conservation project development studies, and ESCO savings report reviews by third-party providers. This practice has been recognized as a best management practice by the DOE.
- Need for Benchmarking Implementation Tools: There is current demand for tools which can facilitate building energy performance benchmarking for the community, and simplify data collection, data aggregation, analysis and reporting. One of the most significant barriers for building energy performance benchmarking is the time consuming task of collecting and aggregating data from multiple sources. Cities need a data aggregation tool which can combine data from multiple sources and allow sharing of that data between various departments within an organization or a city. A common data aggregation and access platform which could store building asset information and energy consumption profiles of all buildings would significantly reduce the time intensive effort of data collecting, and reduce errors. One tool available and

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<sup>13</sup> More information on the fund is available on the SPEER website ([https://eepartnership.files.wordpress.com/2014/02/revolving-loan-fund\\_best-practices\\_final.pdf](https://eepartnership.files.wordpress.com/2014/02/revolving-loan-fund_best-practices_final.pdf))



recently piloted by the city of Austin is the DOE Standard Energy Efficiency Data (SEED) Platform™<sup>14</sup>. There is specifically a need in Texas to develop a tool which can interface with the Smart Meter Texas portal to facilitate a multi-account automated data upload to PortfolioManager. In other states, such as California, Washington, Illinois, and Pennsylvania utilities or energy data management companies are now providing monthly automated data updates to ENERGY STAR PortfolioManager for their customers.

### **Recommendations and Way Forward**


The SPEER region is in the early stages of adopting benchmarking practices in the municipal sector. Below are some recommendations which can help to encourage and accelerate benchmarking practices in Texas and Oklahoma:

- Stakeholder Engagement: This project demonstrated the need for increasing awareness among state and local governments regarding the benefits of benchmarking and disclosure policies. Cities that have initiated benchmarking programs and documented the value of these programs are committed to continue and expand their programs. The benchmarking successes stories from the benchmarking programs initiated by the large cities in Texas and Oklahoma need to be promoted to other medium and smaller size cities in Texas and Oklahoma. This transfer of benchmarking best practices will allow the smaller cities to move towards benchmarking and energy efficiency in their own portfolios.
- Education and Awareness: The stakeholders in Texas and Oklahoma need education and guidance which can help them develop their benchmarking programs. These educational resources could include educational materials, technical guidebooks, awareness about existing tools and methodologies and other assistance to help remove the barriers and facilitate benchmarking.
- Development of City-Utility, City-REP, and City-Third Party Partnerships: The collection of accurate energy consumption data on a regular basis is critical to a robust benchmarking program, and a collaborative partnership with the local utility can be critical in facilitating data collection and aggregation. This project highlighted the need to develop partnerships, where possible, between cities and utilities so that they can collaboratively work together and commonly adopt benchmarking best practices. The U.S. Department of Energy (DOE)' Better Buildings Energy Data Accelerator<sup>15</sup> offers a platform for local governments to join forces with their local utilities and facilitate whole building energy performance data access for the purpose of benchmarking their buildings. In Texas, where 76% of the state is deregulated and customers, including cities, are

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<sup>14</sup><http://energy.gov/eere/buildings/standard-energy-efficiency-data-platform>

<sup>15</sup><http://www1.eere.energy.gov/buildings/betterbuildings/accelerators/energy.html>



served by retail electric providers, in some cases it will make more sense to establish a city-REP pair. And because third parties have access to customers' data when customers choose to share it, the same outcome can be achieved even if the utility and the REP choose not to pair with a given city or cities. In Texas' competitive market, sometimes partnerships with other entities that can provide streamlined data access, analysis, and actionable information to cities will be the best option. As the market for third party energy management services matures, we expect most local governments will opt to pair with third parties as they may be more attuned with the customer's needs.

- Facilitating Data Access and Aggregation in Deregulated areas of Texas: Most cities in Texas have an opportunity to leverage the energy data available through advanced meters, which have been installed in all the competitive areas of the state. The Smart Meter Texas provides detailed views of a customer's historic electric usage in 13-month, 30-day, or 24-hour snapshots and down to 15-minute intervals. The Smart Meter Texas portal now allows customers the option to provide third party providers access their smart meter usage information. This third party access can be used by energy data management companies to facilitate benchmarking, energy analysis, and help customers identify ways to reduce their energy consumption and costs. More tools and providers will be needed to serve this opportunity, to turn this raw data into useful decisions and investments. Dashboards will need to be provided to cities that will make this information not only available, but interesting and useful to customers.

### **SPEER's Commitment to Benchmarking**

SPEER is committed to promote benchmarking and will be working in partnership with the U.S. Department of Energy, State Energy Conservation Office (SECO) and the Houston Advanced Research Center (HARC) to develop and promote guidelines and online resources that will enable stakeholders to develop public and private sector benchmarking and disclosure programs.

SPEER will leverage its [City Efficiency Leaders](#) project to continue to assist the large cities in expanding their programs and eliminating barriers. These best practices will be shared with the mid-size cities to expand the adoption of benchmarking policies.

SPEER will engage with the local utilities in its region and identify and facilitate city-utility partnerships that will work effectively to facilitate municipal benchmarking programs in the region. SPEER will work with stakeholders in the deregulated areas of Texas to raise awareness of Smart Meter Texas and the opportunity for third party data access of electric energy consumption data.

### **Conclusion**

All of the major cities in Texas and Oklahoma that were surveyed for this project have taken some steps towards benchmarking their municipal building portfolio. The benchmarking practices are yielding multiple benefits for the cities and all jurisdictions are committed to expand their benchmarking efforts. There are great opportunities available for these leading municipalities to expand and improve their



programs and also for the medium and smaller sized cities to adopt benchmarking practices of their own. SPEER will continue to work with stakeholders in Texas and Oklahoma for the promotion of benchmarking and the adoption of best practices in its region.



APPENDIX 1

**Table 7 : Municipal Benchmarking Program Contact Information**

City	Department Leading Benchmarking Program	Contact Information
Houston, TX	Office of the Mayor	Lisa Lin Sustainability Manager 832. 393. 0850 <a href="mailto:lisa.lin@houstontx.gov">lisa.lin@houstontx.gov</a>
	Houston City Energy Project	Marina Badoian-Kriticos Advisor 832. 393. 0969 <a href="mailto:Marina.Kriticos@houstontx.gov">Marina.Kriticos@houstontx.gov</a>
Austin, TX	City of Austin- Office of Sustainability	Zach Baumer Climate Program Manager 512. 974.2 836 <a href="mailto:Zach.Baumer@austintexas.gov">Zach.Baumer@austintexas.gov</a>
	Austin Energy	Ngoc-minh Bruce Conservation Program Coordinator 512. 482. 5316 <a href="mailto:ngoc-minh.bruce@austinenergy.com">ngoc-minh.bruce@austinenergy.com</a>
Dallas, TX	Public Works Department	Jesse Dillard Energy Manager 214. 948. 5366 <a href="mailto:jesse.dillard@dallascityhall.com">jesse.dillard@dallascityhall.com</a>
San Antonio, TX	Office of Sustainability	Aaron Stein Senior Energy Analyst 210. 207. 0269 <a href="mailto:aaron.stein@sanantonio.gov">aaron.stein@sanantonio.gov</a>
El Paso, TX	Office of Resilience and Sustainability	Lauren Baldwin Sustainability Program Specialist 915. 208. 9693 <a href="mailto:BaldwinLD@elpasotexas.gov">BaldwinLD@elpasotexas.gov</a>
Fort Worth, TX	Department of Transportation & Public Works' Facilities Management Division;	Sam Gunderson Conservation Specialist 817. 392. 8076 <a href="mailto:samuel.gunderson@fortworthtexas.gov">samuel.gunderson@fortworthtexas.gov</a>



City	Department Leading Benchmarking Program	Contact Information
	Resource Conservation Section	
Oklahoma City, OK	Office of Sustainability	T.O. Bowman Interim Director 405. 297. 3168 <a href="mailto:thomas.bowman@okc.gov">thomas.bowman@okc.gov</a>
Tulsa, OK	Mayor's Office of Economic Development	Brett Fidler Director of Energy & Enterprise Development 918. 576. 5093 <a href="mailto:brettfidler@cityoftulsa.org">brettfidler@cityoftulsa.org</a>



*The South-central Partnership for Energy Efficiency as a Resource*

[www.EEPartnership.org](http://www.EEPartnership.org)