

**Module: Introduction****Page: Introduction**

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**0.1****Introduction**

Please give a general description and introduction to your city.

Houston is the fourth largest city in the United States, with an estimated population of 2.1 million, according to the 2010 U.S. Census. Houston's population is among the youngest and most diverse in the U.S., as well as one of the nation's fastest-growing cities. Houston's economy has a broad industrial base in the energy, aeronautics, and technology industries, and ranks third among areas in Fortune 500 headquarters. The Port of Houston ranks first in the United States in international waterborne tonnage and second in total cargo tonnage. In 2006, the regional Gross Area Product was \$325.5 billion, slightly larger than the Gross Domestic Product of Austria, Poland, or Saudi Arabia. Houston is also home of the Texas Medical Center, the world's largest concentration of healthcare and research institutions, and NASA's Johnson Space Center.

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**0.2****Emissions Accounting Choice**

By checking the boxes below you are indicating that you have fuel and/or GHG emissions data to report at this time.

Select Government to report emissions from your local government operations (also referred to as 'corporate' or 'municipal'): relating to those emissions arising from the operations of the local government.

Select Community to report emissions from the entire city (also referred to as 'geographic' or 'city-wide'): encompassing emissions which are within a particular geopolitical region, over which the city government can exercise a degree of influence through the policies and regulations they implement.

Select both boxes to report fuel and/or emissions for both inventories.

Do not select either box if you have no fuel and/or GHG emissions data to report this year.

## Module: Governance

### Page: Governance

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#### 1.0

**Please describe the process by which the city reviews its progress and manages overall responsibility for climate change.**

When the inventory was first conducted under the previous administration, the Mayor's Office of Environmental Planning measured, monitored, and managed climate-related programs and oversaw reporting for these initiatives. The Multi-Pollutant Emissions Reduction Plan (MERP) from August 2008 calculated GHG emissions for local government operations using 2005 data and outlined a plan to reduce emissions in the city by 2010. Data was gathered from the local utility, city contractors, and other city departments. An update to the MERP was released in December 2009 to document measures that had been completed, were ongoing, or would be completed at a certain future date.

Under the current administration, the Mayor's Office of Sustainability measures, monitors and manages environmental initiatives and coordinates all climate-related reporting for the city. An updated GHG inventory was conducted in 2012 using 2010 data. A similar approach for gathering information and involving key stakeholders to collect data was followed with the new GHG inventory.

In 2013, a consultant to the City who is helping draft a Sustainability Action Plan conducted a GHG inventory using 2012 data, and for the 2014 CDP report, the Mayor's Office of Sustainability will be conducting a 2013 GHG emissions inventory using 2012 data. Data that is being used to inform the inventory is measured, monitored, and managed by the departments. The Mayor's Office leads the effort to combine these data points to report an overall emissions report.

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#### 1.1

**Do you provide incentives for management of climate change issues, including the attainment of GHG reduction targets?**

No

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1.1a

Please complete the table.

Who is entitled to benefit from these incentives?	The type of incentives	Program description
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1.2

**Please describe the impact of national and/or regional climate change activities on your city's own climate change activities.**

Our Great Region 2040 is a high-level plan that offers six “Big Ideas” in the areas of economic development, environment, health, housing, transportation, and resiliency. The plan also contains 15 priority goals related to people, places and prosperity and more than 75 voluntary strategies that communities, local governments and individuals can consider to make their communities great places to live and work. The Our Great Region 2040 plan spotlights six case studies from local cities and counties that highlight real-life examples of how the ideas, goals and strategies could be implemented in the Houston-Galveston region. Our Great Region 2040 is the result of the efforts of hundreds of organizations and thousands of people from across the Houston-Galveston Area Council’s 13-county service area over the past three years. Next steps are for the municipalities to consider adopting the plan or portions of the plan. ([http://www.ourregion.org/OurRegion2040Supporting\\_Documents/OurGreatRegion2040-FINAL.pdf](http://www.ourregion.org/OurRegion2040Supporting_Documents/OurGreatRegion2040-FINAL.pdf))

On a national level, Mayor Parker was selected in November 2013 as a member of President Obama’s Task Force on Climate Preparedness and Resilience to advise the administration on how the federal government can respond to the needs of communities nationwide that are dealing with extreme weather and other climate impacts.

President Obama established the task force as part of his Climate Action Plan to cut carbon pollution, prepare communities for the impacts of climate change that cannot be avoided, and lead international efforts to address this global challenge. Mayor Parker will play an integral role in ensuring the Task Force’s recommendations to the President are responsive to the needs of all stakeholders in the Houston area.

“I am honored to have been chosen for this prestigious position and eager to be able to represent Houston’s pragmatic and diverse points of view on this issue,” said Mayor Parker. “We are a city that is forward thinking when it comes to sustainability and the environment. We have a wealth of technological expertise in our existing energy sector. In fact, those companies are becoming the leaders in development of the new technologies that will support our nation’s future environmental policies.”

The State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience will develop recommendations for the President on how the Federal Government can best support state, local and tribal leaders in their efforts to prepare for the impacts of climate change. This will include recommendations for removing Federal barriers to resilient investments, modernizing Federal grant and loan programs to better support local priorities, developing the information and tools that are needed to prepare communities, and other relevant measures.

Other national level climate-related activities include the City of Houston’s participation in the U.S. Department of Energy’s Better Buildings Challenge and Better

Buildings Accelerator programs. The Better Buildings Challenge is a nationwide public-private partnership that seeks to improve energy efficiency 20 percent by 2020 in commercial, government and school buildings across the country. The Better Buildings Accelerators are part of President Obama's Climate Action Plan to engage leaders in state and local governments, utilities, and industry to demonstrate innovative policies and programs that will transform the energy efficiency market and cut building energy waste.

## Module: Risks & Adaptation

### Page: Physical Risks

#### 2.0

Do current and/or anticipated effects of climate change present significant physical risks to your city?

Yes

#### 2.0a

Please list and describe the effects of climate change which you expect to experience in your city, together with anticipated timescales.

Effects of climate change	Level of risk	Anticipated timescale in years	Impact description
Hotter summers	Serious	Current	Hotter summers increase energy use in buildings, contribute to higher ozone levels, can be potential causes for brownouts which can lead to increased levels of PM 2.5 and PM 10, and can lead to heat-related illnesses/death.
More frequent heat waves	Serious	Current	More frequent heatwaves increase energy use in buildings, contribute to higher ozone levels, and can lead to heat-related illnesses/death.
Increased urban	Serious	Current	Increased urban heat island effect increases energy use in buildings, does not provide relief for people and

Effects of climate change	Level of risk	Anticipated timescale in years	Impact description
heat island effect			animals in the evening, contributes to air pollution, and can lead to heat-related illnesses/death.
More frequent droughts	Serious	Current	More frequent droughts deplete water resources for people and wildlife and cause infrastructure problems. It also leads to drought-stressed trees and vegetation which reduces the urban forest that would normally provide cooling and improve air quality.
Increased risk of storm surges	Serious	Current	Increased risk of storm surges cause flooding, property damage, and power outages. It also interferes with communications/telecommunication, destroys habitats and vegetation, and can be adversely affect human health.
More hot days	Serious	Current	More hot days will increase energy use in buildings and put more stress on the grid, which can be potential causes for brownouts.

## 2.0b

Please explain why the anticipated physical effects of climate change present no significant risk to your city.

## 2.1

Please describe any compounding factors that may worsen the physical effects of climate change in your city.

As the City of Houston experiences more extreme weather events, this will likely change the landscape of many of the city's open spaces. The most recent example is the loss of millions of trees in the Houston area due to the worst drought in the city's history in 2011. An article published in the Houston Chronicle listed the compounding factors of losing so many of the city's urban trees (<http://www.chron.com/news/houston-texas/article/Millions-of-trees-likely-to-die-due-to-drought-2153585.php>). Some consequences include increased ground-level ozone and carbon dioxide release from dying trees, insect outbreaks on drought-stressed trees, reduced capacity to cool the air, increased urban heat island areas, loss of habitat and food for wildlife, loss of tourism due to the loss of wildlife habitat.

In 2011, Texas lost 301 million trees due to the drought, and an estimated 19 million was in Harris County: (<http://www.chron.com/news/article/2011-Texas-drought-slaughtered-301-million-trees-3893965.php>)

As sea level is expected to rise, the Port of Houston could be more susceptible to hurricanes and storm surges which would easily inundate factories, businesses and homes near the water. As the water reaches closer into the city, ocean-borne illnesses are more likely to occur in the population. The natural flora and fauna that have been in the region and support the many ecosystems locally could be devastated by the expected change in ocean chemistry. This could not only harm the individual ecosystems in the area but also could harm the entire regional ecosystem. Those individuals who live near, and depend on, these ecosystems and waterways for their livelihood would be adversely affected.

Texas is already prone to drought. Higher temperatures cause higher evaporation rates in the streams and reservoirs, which can affect the water supply. With higher evaporation rates there could be a decrease in the freshwater flow into the Gulf of Mexico which would endanger coastal health.

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## 2.2

**Do you consider that the physical impacts of climate change could threaten the ability of businesses to operate successfully in your city?**

Yes

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### 2.2a

**Please explain the reasoning behind your response.**

The physical impacts behind extreme weather vary greatly in Houston. The most devastating consequences often result from tropical hurricanes, storm surges, and flooding. As seen with Tropical Storm Allison, the region had 22 fatalities, 95,000 damaged automobiles and trucks, 73,000 damaged residences, 30,000 stranded residents in shelters, and over \$5 billion in property damage.

Hurricane Ike damaged or destroyed over 200,000 homes in the Houston-Galveston region, washed away roads, and rendered drinking water, waste water and electrical utilities inoperable. Power outages reached an estimated 2.8 to 4.5 million customers, shutting down some office operations for weeks. Thousands of businesses suffered physical damage, economic distress, displaced workforce, reduced customer base and extended periods of business interruption. Damage estimates top \$15 billion statewide.

Not only has Houston experienced extreme flooding/hurricanes, but also it must contend with extreme droughts, never before seen in recent history. Effects of the extreme drought that hit Houston in 2011 included reservoir depletion, bursting pipes, damaged streets and loss of millions of trees. At the peak of the record-shattering heat wave and drought, Houston lost 18 billion gallons of water because of countless burst pipes, costing the city tens of millions of dollars in lost revenue. Along the 7,000 miles of pipes across the city, over 700 water main breaks were occurring each day due to weakened and corroded pipes and soil that was too dry to handle the expansion in the pipes.

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**2.3**

**Please select the primary process or methodology used to evaluate the physical risks to your city.**

Primary Methodology	Description
Other:	Fiscal restraints preclude contracting a study at this time, but academic institutions, the local council of government, and research organizations have conducted studies evaluating the physical risk in Houston. The SSPEED Center at Rice University, the Houston-Galveston Area Council, and the Houston Advanced Research Center have done risk assessments for the region.

**Page: Adaptation**

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**3.0**

**Do you have a city-wide plan for increasing your city's resilience to the expected physical effects of climate change?**

No

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**3.0b**

**Please explain why not and any future arrangements you have to create a plan.**

Individual measures have been implemented as climate-related events have occurred in the City, but no formal overarching adaptation plan has been developed due to limited staff, time, and resources. An adaptation plan is being discussed and considered for the City's update to its climate action plan, which would focus on local government operations.

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**3.0a**

Please indicate the title of your climate adaptation plan, the year it was published and attach the document in the space provided.

Publication title	Publication year	Upload
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### 3.1

Please describe the actions you are taking to reduce the risk to your city's infrastructure, citizens, and businesses from climate change as identified on the previous page (Q2.0a).

Effects of climate change	Actions to reduce vulnerability	Action Description
Hotter summers	Projects and policies targeted at those most vulnerable	The City of Houston activates Heat Emergency Plan and opens cooling centers (e.g. city libraries, multi-service centers, and park and recreation centers) to citizens without access to air conditioning during heat waves. The Beat the Heat Program was funded by Reliant Energy for the past five years and evolved with the Houston Department of Health and Human Services to be increasingly responsive to the need for relief from Houston's extremely hot summers. Between June and October 2013, there were over 15,000 visitors in the five Centers, an increase of 28% over the number served in 2012. 48% of those service encounters were with citizens over the age of 60, many of whom were also participants in our senior congregate meal program or fitness activities. For the past two years the program also provided funding to provide air conditioners for individuals who were primarily home bound. These individuals were most at risk for heat related illness and often closed themselves up at home, gradually unaware of climbing temperatures. In the second year, portable air conditioners were provided, which allowed recipients to be more mobile in their homes. In 2013, 290 portable or window air conditioning units were provided through Reliant support. The service is accompanied by installation of window units and education of recipient and care givers on use. The Beat the Heat Community Education has also provided information on healthy and economical ways to manage Houston's hot summers. Public information on heat precautions, energy bill review, participation in community events to promote heat safety and distribution of weatherization kits have all contributed to making sure we Beat the Heat together.
More frequent heat waves	Projects and policies targeted at those most vulnerable	The City of Houston activates Heat Emergency Plan and opens cooling centers (e.g. city libraries, multi-service centers, and park and recreation centers) to citizens without access to air conditioning during heat waves. The Beat the Heat Program was funded by Reliant Energy for the past five years and evolved with the Houston Department of Health and Human Services to be increasingly responsive to the need for relief from Houston's extremely hot summers. Between June and October 2013, there were over 15,000 visitors in the five Centers, an increase of 28% over the number served in 2012. 48% of those service encounters were with citizens over the age



Effects of climate change	Actions to reduce vulnerability	Action Description
		<p>of 60, many of whom were also participants in our senior congregate meal program or fitness activities. For the past two years the program also provided funding to provide air conditioners for individuals who were primarily home bound. These individuals were most at risk for heat related illness and often closed themselves up at home, gradually unaware of climbing temperatures. In the second year, portable air conditioners were provided, which allowed recipients to be more mobile in their homes. In 2013, 290 portable or window air conditioning units were provided through Reliant support. The service is accompanied by installation of window units and education of recipient and care givers on use. The Beat the Heat Community Education has also provided information on healthy and economical ways to manage Houston's hot summers. Public information on heat precautions, energy bill review, participation in community events to promote heat safety and distribution of weatherization kits have all contributed to making sure we Beat the Heat together.</p>
Increased urban heat island effect	White roofs	<p>Part of Houston's Commercial Energy Conservation Code is a mandate for cool roofs. Low slope roofs up to 2:12 shall be provided with a roof covering where the exterior surface has: (a) a minimum total solar reflectance of 0.70 when tested in accordance with one of the solar reflectance test methods listed below, and (b) a minimum thermal emittance of 0.75 when tested in accordance with one of the thermal emittance test methods listed below.</p>
More frequent droughts	Awareness campaign/education to reduce water use	<p>Mandatory water conservation measures were implemented to stabilize water levels in Lake Houston in the summer of 2011. While restrictions were mandatory, the measures started with warnings and an informational campaign to citizens. Those who did not comply after a warning were issued fines. In addition, to seek recommendations and take action to promote water conservation measures, the Mayor created a Water Conservation Task Force in 2012: <a href="http://www.houstontx.gov/mayor/press/20120713.html">http://www.houstontx.gov/mayor/press/20120713.html</a>. Recommendations are being reviewed now.</p>
Increased risk of storm surges	Crisis planning and practice exercises	<p>The City of Houston acquired 17 SPACE units, which are mobile solar generators made with shipping containers. The generators are designed for emergency relief efforts and were purchased to serve in the recovery efforts from future hurricanes. The units contain refrigerators and air conditioning to provide relief and also to allow emergency equipment to be hooked up when needed. ReBuild Houston is the City of Houston's initiative to improve the quality of life and mobility for residents of the city by rebuilding drainage and street infrastructure. The first year of Rebuild Houston, 16 major street or drainage improvement projects and 12 local drainage projects were completed. Another 14 major projects and 4 more local drainage projects were continued or started. 75 miles of storm sewers were cleaned and 277 miles of road ditches were regarded. \$180 million has been invested in improvements to date.</p>
More hot days	Projects and policies targeted at those most vulnerable	<p>The City of Houston activates Heat Emergency Plan and opens cooling centers (e.g. city libraries, multi-service centers, and park and recreation centers) to citizens without access to air conditioning during heat waves. The Beat the Heat Program was funded by Reliant Energy for the past five years and evolved with the Houston Department of Health and Human Services to be increasingly responsive to the need for relief from Houston's extremely hot summers. Between June and October 2013, there were over 15,000 visitors in the five Centers, an increase of 28% over the number served in 2012. 48% of those service encounters were with citizens over the age of 60, many of whom were also participants in our senior congregate meal program or fitness activities. For the past two years the program also provided funding to provide air conditioners for individuals who were primarily</p>

Effects of climate change	Actions to reduce vulnerability	Action Description
		<p>home bound. These individuals were most at risk for heat related illness and often closed themselves up at home, gradually unaware of climbing temperatures. In the second year, portable air conditioners were provided, which allowed recipients to be more mobile in their homes. In 2013, 290 portable or window air conditioning units were provided through Reliant support. The service is accompanied by installation of window units and education of recipient and care givers on use. The Beat the Heat Community Education has also provided information on healthy and economical ways to manage Houston's hot summers. Public information on heat precautions, energy bill review, participation in community events to promote heat safety and distribution of weatherization kits have all contributed to making sure we Beat the Heat together.</p>

**Page: Social Risks**

**4.0**

**Does your city face any social risks as a result of climate change?**

Yes

**4.0a**

**Please complete the table**

Social impacts of climate change	Anticipated timescale in years	Impact description
Fluctuating socio-economic conditions	Short-term	With longer heat events, at-risk populations that have limited access to cooling centers or do not have air-conditioning units within their place of residence are more susceptible to facing heat-related illnesses or death.

Social impacts of climate change	Anticipated timescale in years	Impact description
Increased conflict and/or crime	Medium-term	Loss of power after extreme weather events, such as hurricanes, can mean higher incidence of crime (e.g. looting and theft), as seen in the aftermath of Hurricane Ike.
Increased incidence and prevalence of disease	Short-term	During times of heavy rain events, flooding can occur, and if the ground is oversaturated, pools of water can attract mosquitoes, which can increase the prevalence of mosquito-borne diseases.
Increased demand for public services (including health)	Current	The Beat the Heat Program was funded by Reliant Energy for the past five years and evolved with the Houston Department of Health and Human Services to be increasingly responsive to the need for relief from Houston's extremely hot summers. Between June and October 2013, there were over 15,000 visitors in the five Centers, an increase of 28% over the number served in 2012. 48% of those service encounters were with citizens over the age of 60, many of whom were also participants in our senior congregate meal program or fitness activities. For the past two years the program also provided funding to provide air conditioners for individuals who were primarily home bound. These individuals were most at risk for heat related illness and often closed themselves up at home, gradually unaware of climbing temperatures. In the second year, portable air conditioners were provided, which allowed recipients to be more mobile in their homes. In 2013, 290 portable or window air conditioning units were provided through Reliant support. The service is accompanied by installation of window units and education of recipient and care givers on use. The Beat the Heat Community Education has also provided information on healthy and economical ways to manage Houston's hot summers. Public information on heat precautions, energy bill review, participation in community events to promote heat safety and distribution of weatherization kits have all contributed to making sure we Beat the Heat together.
Increased resource demand	Short-term	According to a local newspaper, the demand for power on the grid that serves most of Texas hit the third highest level in its history on Wednesday, August 7, 2013. This was the highest demand so far in 2013, which has included a mild summer compared to 2012 and the record-breaking 2011, Texas' hottest summer on record.

4.0b

Please explain why not.

**Module: Opportunities**

**Page: Opportunities**

5.0

Does climate change present any economic opportunities for your city?

Yes

5.0a

Please indicate the opportunities and describe how the city is positioning itself to take advantage of them.

Economic opportunity	Describe how the city is maximizing this opportunity
Development of new business industries (e.g. clean tech)	Houston is often regarded as a hub for the world's leading energy companies, but it is also gaining momentum on growing a clean energy job market. According to Clean Edge, Inc., Houston jumped from 22nd to 16th in their Metro Index from 2012 to 2013. The Metro Index tracks and analyzes clean-tech activities of the 50 largest U.S. metro regions through nearly two dozen indicators within the categories of Green Buildings, Advanced Transportation, Clean Electricity & Carbon Management, and Clean Tech Investment, Innovation, & Workforce. Also, more than 17.8 percent of the nation's total biodiesel production capacity resides in the Houston region. According to the U.S. Energy Information Administration, Texas' annual biodiesel production capacity of 431.0 million gallons is the highest in the nation. With 14 biodiesel plants, Texas has more biodiesel plants than Iowa (10) or California (9). The Houston area represents more than 92.8 percent of all biodiesel production capacity in the state of Texas. From bioenergy companies to biotechnology firms, the city encourages and welcomes new economic development in the clean energy sector. In a Brookings Institution study, Houston ranked 9th in the nation for top local clean economies. It was reported that there were 39,986 green jobs in the region in 2011. As reported in a local news source, "To develop the rankings, Brookings analyzed the sector of the economy that produces goods and services with an environmental benefit. In the report, 'the clean economy is divided into 39 distinct segments, reflecting economic activity involved in producing a broad spectrum of clean products, from goods such as wind turbines and solar photovoltaics to services such as mass transit and regulation.' The widest growth has taken place in the realms of professional environmental services and recycling and reuse. Between 2003 and 2010, the green economy grew by 5.3 percent annually in Houston. That leads to more money in green workers' pockets — the estimated median wage in Houston's clean economy is \$42,779 compared to \$38,608 for all jobs in the city." <a href="http://houston.culturemap.com/news/city-life/07-13-11-a-clean-green-job-growing-machine-houston-tops-texas-in-green-jobs-ranks-ninth-in-country/">http://houston.culturemap.com/news/city-life/07-13-11-a-clean-green-job-growing-machine-houston-tops-texas-in-green-jobs-ranks-ninth-in-country/</a>
Increased attention to other environmental concerns	As more people notice extreme weather events occurring in Houston, there is more attention placed on how the community needs to be more resilient. For instance, after the major drought in 2011, residents were increasingly inquiring about installing rainwater harvesting and the City's annual half-price rain barrel sale.
Increased infrastructure	ReBuild Houston is the City of Houston's initiative to improve the quality of life and mobility for residents of the city by rebuilding its

Economic opportunity	Describe how the city is maximizing this opportunity
investment	drainage and street infrastructure. To support the initiative, the city has established a dedicated, pay-as-you-go fund to maintain the infrastructure and to plan upgrades to meet future needs as the city grows. In the first year of Rebuild Houston, 16 major street or drainage improvement projects and 12 local drainage projects were completed. Another 14 major projects and 4 more local drainage projects were continued or started. 75 miles of storm sewers were cleaned and 277 miles of road ditches were regarded. \$180 million have been invested in making these improvements. <a href="http://www.rebuildhouston.org/">http://www.rebuildhouston.org/</a>
Improved efficiency of operations	In the City's municipal energy efficiency program, 5.2 million square feet of municipally-owned buildings are achieving guaranteed energy use reductions approaching 30% with paybacks of, on average, less than ten years. The next tranche of work will include 18 libraries and use Qualified Energy Conservation Bonds to fund additional municipal energy efficiency work through performance contracting.

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5.0b

Why not?

## Module: Emissions - Local Government Operations

### Page: Local Government - Methodology

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LGO1.0

Please state the dates of the accounting year or 12-month period for which you are reporting a GHG measurement inventory for your local government operations.

Tue 01 Jan 2013 - Tue 31 Dec 2013

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LGO1.1

**Please indicate the category that best describes the boundary of your municipal GHG emissions inventory.**

Departments, entities or companies over which operational control is exercised

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**LGO1.2**

**Please indicate which of the following major sources of emissions are included in your municipal GHG emissions inventory.**

<b>Source of emissions</b>	<b>Status</b>
Airport(s)	Included
Buildings	Included
Buses	Not applicable
Electricity generation	Included
Electricity transmission and distribution	Not applicable
Employee commuting	Not included
Incineration of waste	Not applicable
Landfills	Not applicable
Local trains	Not applicable
Maritime port	Not applicable
Municipal vehicle fleet	Included
Regional trains	Not applicable
Roads / highways	Not applicable
Street lighting and traffic signals	Included
Subway / underground	Not applicable
Thermal energy	Not applicable
Waste collection	Included
Wastewater treatment	Included
Water supply	Included

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**LGO1.3**

Please give the name of the primary protocol, standard or methodology you have used to calculate GHG emissions.

Primary protocol	Comment
Local Government Operations Protocol (ICLEI/The Climate Registry/California Climate Action Registry/California Air Resources Board)	The Local Government Operations Protocol (LGOP) has been widely used for other municipal GHG emissions inventories in the U.S. and was the most applicable for our reporting. This was the primary protocol that the City utilized.

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**Further Information**

**Page: Local Government - Energy Data**

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**LGO1.4**

Please give the total amount of fuel (refers to direct/Scope 1 emissions) that your local government has consumed this year.

Fuel	Amount	Units
Natural gas	14337340	Therms

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**LGO1.5**

How much electricity, heat, steam, and cooling (refers to indirect/Scope 2 emissions) has your local government purchased for its own consumption during the reporting year?

Type	Amount	Units
Electricity	1237328382	kWh

**Page: Local Government - GHG Emissions Data**

**LGO1.6**

Please provide total (Scope 1 +Scope 2) GHG emissions for your local government's operations, in metric tonnes CO2e.

563445

**LGO1.7**

If applicable, please provide the following GHG emissions.

Scopes are a common categorization method.

Scope 1: All direct GHG emissions (with the exception of direct CO2 emissions from biogenic sources).  
 Scope 2: Indirect GHG emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling.

Total Scope 1 activity in metric tonnes CO2e emitted	Total Scope 2 activity in metric tonnes CO2e emitted
171342	392103

**LGO1.8**

Do you measure Scope 3 emissions?



Yes

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**LGO1.8a**

Please complete the table.

Source of Scope 3 emissions	Emissions (metric tonnes CO2e)	Comment
Solid Waste	107442	This measures both Municipal and Residential Waste.

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**LGO1.8b**

Please explain why not and detail your plans to do so in the future, if any.

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**LGO1.9**

Where it will facilitate a greater understanding of your government emissions, please provide a breakdown of these emissions by department, facility, greenhouse gas (CO2, CH4, N2O etc) or by any other classification system used in your city.

Department / Facility / GHG / Other	Type	Emissions (metric tonnes CO2e)
Convention & Entertainment: Buildings and Facilities	Total figure	21017
General Services: Buildings and Facilities	Total figure	45602
Municipal Courts: Buildings and Facilities	Total figure	1582
Park & Recreation: Buildings and Facilities	Total figure	16320
Public Works: Buildings and Facilities	Total figure	10830
Houston Airport System: Buildings and Facilities	Total figure	94470
Solid Waste: Buildings and Facilities	Total figure	1241
Vehicle Fleet	Scope 1	95130

Department / Facility / GHG / Other	Type	Emissions (metric tonnes CO2e)
Street Lights	Scope 2	36207
Traffic Lights	Scope 2	2883
Water Delivery Facilities	Total figure	87957
Wastewater Facilities	Total figure	150205

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**LGO1.11**

**Please indicate why your emissions have increased, decreased, or stayed the same from the previous year, and please describe why.**

Change in emissions	Reason for change
Decreased	Using a baseline of 2007, the City of Houston's municipal GHG emissions have decreased 32% in 2013. A third party consultant conducted a 2012 GHG inventory, and an 11% decrease has been realized between 2012 and 2013. This is attributable to decreased electricity usage, decreased diesel fuel consumption, decreased landfilled waste, and increased green power purchasing.

**Page: Local Government - External Verification**

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**LGO1.12**

**Has the GHG emissions data you are currently reporting been externally verified or audited in part or in whole?**

No

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**LGO1.12a**

**Please provide any other relevant information about the emissions verification process.**

Due to budget constraints, no external auditor verified the inventory. The greenhouse gas emissions inventory conducted for the emissions in calendar year 2012 was done by a third party consultant using grant funding. The current inventory was conducted in-house, but the third party consultant did provide guidance and feedback.

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**Further Information**

**Module: Strategy**

**Page: GHG Emissions Reduction - Local Government Operations**

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**6.0**

**Do you have a GHG emissions reduction target in place for your local government operations?**

Yes

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**6.0a**

**Please provide details of your local government operations emissions reduction target.**

Baseline year	Baseline emissions (metric tonnes CO2e)	Percentage reduction target	GHG sources to which the target applies	Target date	Comment
2007	985043	36%	Energy usage, Fuel consumption, and municipal and residential solid waste	2016	

6.0b

Please explain why you do not have a local government operations emissions reduction target.

6.1

What activities are you undertaking to reduce your emissions in your local government operations?

Emissions reduction activity	Projected emissions reduction over lifetime (metric tonnes CO2e)	Action description
Energy Demand in Buildings > Building Codes and Standards		The City adopted a Green Building Resolution, which set a target of LEED Silver certification for new construction, replacement facilities and major renovations of City of Houston-owned buildings. The City has completed 21 LEED certified projects with another 5 projects in the pipeline. As of September 2011, commercial buildings in Houston had to comply with ASHRAE 90.1-2007 or 2009 IECC commercial energy code. The City has also passed a mandatory cool roof requirement for new construction and roof replacements.
Finance > Adaptation Infrastructure Finance		ReBuild Houston is the City of Houston's initiative to improve the quality of life and mobility for residents of the city by rebuilding its drainage and street infrastructure. To support the initiative, the City has established a dedicated, pay-as-you-go fund to maintain the infrastructure, and to plan upgrades to meet future needs as the city grows. ReBuild Houston will help reduce street flooding, improve mobility, and reduce structural flooding. In its first year, the City completed a total of 16 major street or drainage improvement projects and 12 local drainage projects, as well as continuing or starting another 14 major projects and 4 more local drainage projects. The City resurfaced 136 lane miles of asphalt streets, cleaned 75 miles of storm sewers and re-graded 277 miles of road ditches. To date, the City has already invested approximately \$180 million in improvements to its infrastructure since the program began.
Energy Demand in Buildings > Energy efficiency/retrofit measures		A total of 297 City facilities are expected to achieve guaranteed energy use reductions approaching 30%, saving over 22 million kWh of electricity every year, with paybacks of, on average, less than ten years. The City has invested over \$60 million to retrofit 5.2 million square feet. The energy reduction measures originally identified by the Houston Airport System (such as installing motion detectors for lighting specific interior areas, installing control measures such as photo cells, clocks and/or timers on all outside lighting, cutting the energy supply to unoccupied retail space, and requiring lights in electrical

Emissions reduction activity	Projected emissions reduction over lifetime (metric tonnes CO2e)	Action description
		closets be turned off when not in use) mostly have been implemented. Additional measures targeted HVAC systems of the HAS Administration Building and the Technical Services Buildings. HVAC systems are now shut off when the buildings are not in use. It is important to note that the Houston Airport System is experiencing a period of accelerated growth. This needs to be monitored to ensure that the progress achieved to date is not negated by expected growth. The General Services Department instituted a supply- side energy management program in 2006. The City purchased 186 energy misers, energy saving devices, for cold beverage vending machines in City facilities.
Energy Supply > Low or zero carbon energy supply generation		The City of Houston has signed an agreement with Reliant Energy, an NRG Energy company, to purchase over 140 MW of renewable power for the next two years. From July 1, 2013 through June 30, 2015, the City's purchase of green power will account for half of its annual electricity demand. The City will be using almost 623,000 mWh of green power per year, which is equivalent to the amount of kilowatt-hours needed to power over 55,000 homes each year. "Houston is already known as the energy capital of the world, but we are committed to becoming the alternative energy capital of the world as well," said Mayor Annise Parker. "Purchasing green power reduces the environmental impacts of electricity use, decreases the cost of renewable power over time and supports the development of new renewable generation. A triple win for Houstonians." This purchase puts Houston as the largest municipal purchaser of renewable power in the nation, and in the top 10 overall in the nation, according to EPA estimates. The City has purchased renewable energy credits (RECs) that are Green-E certified. Taking advantage of more cost effective and cost competitive REC prices, the City has maintained a relatively flat power price while also increasing its percentage of renewable energy in its portfolio. The City has committed \$2 million for this 2-year agreement, less than a \$0.01 per kWh on top of the City's power price.
Transport > Improve fuel economy and reduce CO2 from motorized vehicles		The City of Houston is replacing older, high mileage equipment in order to reduce current and future maintenance costs, increase vehicle reliability, and decrease emissions. Three specific measures have been planned to achieve this goal of Fleet Use and Replacement – Reduce fleet size, Rejuvenate the current fleet, and Better track/monitor fleet. The City has the 3rd largest municipal hybrid fleet in the nation. Hybrids now constitute more than fifty percent of the city's light-duty fleet. 27 Nissan Leafs are currently in the municipal fleet. The city estimates that its fleet of 27 Nissan LEAFs will accrue \$110,000 in annual savings compared to internal combustion engine vehicles. Since these vehicles have a 10-year lifespan, the City will realize 8 years of significant fuel savings. The City also has an anti-idling policy for municipal vehicles (A-P 2-2 Section 7.2.29).
Outdoor Lighting > LED / CFL / other luminaire technologies		The City has completed replacing the incandescent bulbs at all of its 2,450 signalized intersections with LEDs, which are 75% more energy efficient. In addition, the City is now realizing over \$3.6 million a year in savings or around \$10,000 in savings per day.
Waste > Recycling or composting collections and/or facilities		The City recycles in all City facilities. The new recycling program expanded the recycling opportunities at City building and facilities to include plastics # 1- 7 (except Styrofoam and film bags); aluminum and bi- metal cans; glass and cardboard in addition to all types of paper. The City launched a mandatory

Emissions reduction activity	Projected emissions reduction over lifetime (metric tonnes CO2e)	Action description
		yard waste composting program in April 2010 and has diverted 60,000 tons of yard waste in the last year, with disposal savings of \$2 million. Houston's new proposed program, One Bin for All, which will allow residents to discard all materials in one bin, treating trash as valuable assets, dramatically increasing recycling using game changing technologies, will also be applied to the municipal sector.
Urban Land Use > Urban agriculture		The City Gardens and Farmers Market Initiative supports urban gardens and markets that inspire and empower people of diverse backgrounds to grow, eat and buy local and organic food. The initiative improves health and nutrition, creates community and supports valuable local businesses that together sustain and improve the environment. The City Gardens and Farmers Market initiative includes: <ul style="list-style-type: none"> <li>• City Gardens at Bob Lanier Public Works Building: 25 vegetable container gardens on both sides of a 27-story skyscraper in downtown Houston.</li> <li>• City Hall Victory Garden: 20 vegetable container gardens, berry trestle and fruit trees in Tranquility Park, next to City Hall.</li> <li>• Houston Permitting Center: Five raised garden beds next to an adaptive reuse building that is going for LEED Gold Certification.</li> <li>• City Hall Farmers Market: supports local and organic farmers and assists over 40 "micro businesses" through a weekly Wednesday farmer's market at City Hall. The public can enjoy lunch from vendors or pick up groceries while at the same time supporting local, fresh and sustainable food all amidst Houston's dramatic downtown urban setting. Top chefs perform cooking demos, and there are weekly musical guests.</li> </ul>
Transport > Transportation demand management		The City started Houston Fleet Share in August 2012. Through this program, 50 city-owned fleet vehicles – including 25 Nissan Leaf EVs and other plug-in electric and hybrid vehicles – were outfitted with Zipcar's proprietary car sharing technology for use by city employees across numerous departments. This program is the first of its kind to utilize electric vehicles. The program is designed to help the City of Houston improve efficiency, promote sustainability and save money - all without sacrificing employee mobility. Houston's FleetShare program currently has 651 members and is growing in popularity. As battery electric vehicle utilization rates reach fifty percent per vehicle, the city will procure more electric vehicles. The vehicles are currently being reserved at a 47% utilization rate.
Energy Demand in Buildings > Financing mechanisms for retrofit		Mayor Annise Parker announced in February 2014 that the City of Houston is expanding its municipal energy efficiency program to retrofit libraries and other City of Houston facilities. The City will be using Qualified Energy Conservation Bonds (QECBs) to fund this work. QECBs are federally-subsidized bonds that enable state, tribal and local government issuers to borrow money to fund a range of energy conservation projects at very low borrowing rates. Qualifying projects include using energy efficiency capital expenditures in public buildings that reduce energy consumption by at least 20%. The City of Houston is the first city in Texas to utilize this financing for energy efficiency. The City will take advantage of low interest rates provided by the QECBs. The bonds have been awarded at an interest cost of below one percent, the lowest fixed interest rate received by the City in its history. Many of the City's buildings are using older, inefficient lighting, mechanical systems and control systems. This project phase will upgrade systems for 18 library facilities, the Dalton Street Property Maintenance facility and the Houston Emergency Center (HEC). Overall, these measures will reduce energy, water consumption

Emissions reduction activity	Projected emissions reduction over lifetime (metric tonnes CO2e)	Action description
		and operating costs of City facilities. In addition, the energy savings are guaranteed by the performance contract. This is the City's third phase of an energy savings performance contract for energy conservation measures with Schneider Electric. Numerous energy efficiency measures have been implemented to date including: -Hurricane emergency power remediation/hardening of the City IT network at 611 Walker -Critical IT area HVAC replacement -City Hall lighting upgrade -Critical system replacements at SW Water Treatment Plant -Police command center reliability upgrades at 3 locations - City-wide HVAC control systems upgrade to improve service response -Central plant upgrades in 8 major facilities

**Page: GHG Emissions Reduction - Community**

**7.0**

**Do you have a city-wide GHG emissions reduction target in place for your community?**

No

**7.0a**

Please provide details of your city-wide reduction target.

Baseline year	Baseline emissions (metric tonnes CO2e)	Percentage reduction target	GHG sources to which the target applies	Target date	Comment

**7.0b**

Please explain why you do not have a city-wide emissions reduction target.

The City has not created a community-wide climate action plan with an emissions reduction target. The completion of the "Our Great Region 2040 Plan" from the Houston-Galveston Area Council and the City's participation in the STAR Communities program could help inform a community-wide plan for Houston, if a plan is decided to be pursued. Internal departmental discussions for a comprehensive general plan are also being discussed currently.

## 7.1

### What activities are you currently undertaking to reduce emissions city-wide?

Emissions reduction activity	Projected emissions reduction over lifetime (metric tonnes CO2e)	Action description
Energy Demand in Buildings > Building Codes and Standards		As of September 2011, commercial buildings in Houston had to comply with ASHRAE 90.1-2007 or 2009 IECC commercial energy code. The City has also passed a mandatory cool roof requirement for new construction and roof replacements. In January 2014, Houston City Council approved another five percent increase in the Houston Residential Energy Conservation Code. With this increase the local minimum energy efficiency requirements for new construction of one and two family homes, townhouses and apartments up to three stories in height is 15 percent above what is mandated by state law. This is the third year in a row the local code has been increased by five percent. Currently, state law designates the 2009 International Energy Conservation Code (IECC) as the energy code in Texas. In 2011, Houston City Council adopted a stricter version of the IECC. An update of the IECC yet to be approved by the state is expected to mirror Houston's requirements.
Transport > Infrastructure for non-motorized transport		The City of Houston offers over 300 miles interconnected bikeway network spanning across 500 square miles. The network includes bike lanes, bike routes, signed-shared lanes and shared-use paths, commonly referred to as 'hike and bike' trails, which includes rails to trails, and other urban multi-use paths. In addition to these bicyclist transportation facilities, there are over 80 miles of hike and bike and nature trails found in City of Houston parks.
Transport > Improve the accessibility to public transit systems		Houston METRO's comprehensive light rail plan plays a dynamic role in the city's life, providing smarter, more energy-efficient transportation options in the form of five new rail lines. The lines will connect citizens and visitors to every major activity center in our metropolitan area. They'll provide exceptional new opportunities for residents and businesses alike. METRO is the local transportation authority. Currently, Houston is expanding its light-rail infrastructure with two new light-rail lines currently under construction and the extension of the existing Main Street line, going from 7.5 miles to over 22 miles. The original 7.5-mile Main St. line averaged nearly 5,000 boardings per mile totaling about 37,000 daily. In December 2013, a 5.3-mile extension of the existing Main Street Line opened to the public. The additional new lines are expected to be completed in late 2014. With this \$4 billion investment, the expanded light-rail system will be an essential



Emissions reduction activity	Projected emissions reduction over lifetime (metric tonnes CO2e)	Action description
		element of the city's plans to meet the transportation and environmental challenges of today and tomorrow, easing our growing traffic congestion, improving the city's air quality and changing the way Houston moves. METRO celebrated its 100-millionth rider in April 2013.
Waste > Recycling or composting collections and/or facilities		The City launched a mandatory yard waste composting program in April 2010 and has diverted 60,000 tons of yard waste in the last year, with disposal savings of \$2 million. The City has also deployed single stream recycling to one-third of single-family households and is working on full deployment. In October 2013, the City of Houston Solid Waste Management Department (SWMD) announced an additional 70,000 households that were added to its popular automated curbside recycling program. As part of the expansion, residents in neighborhoods throughout Houston will receive one 96-gallon green automated cart similar to the black automated garbage cart. There are currently 211,000 homes participating in the Automated Recycling program.
Energy Demand in Buildings > Financing mechanisms for retrofit		The City of Houston launched the Energy Efficiency Incentive Program allowing eligible commercial building owners to apply for funding to make energy efficiency improvements and reduce utility expenses and greenhouse gases. The City has committed approximately \$3 million for the program and will provide incentives to offset the up-front implementation costs. Over half the funds have been set aside for Class B and C buildings.
Energy Demand in Buildings > Building performance rating and reporting		The Houston Green Office Challenge ( <a href="http://www.houstongoc.org">www.houstongoc.org</a> ), launched in September 2010, invites commercial office owners/managers and tenants in Houston to increase their environmental and economic performance in cleaner transportation choices, energy conservation, property management/tenant engagement, water efficiency and waste reduction. To date, the Houston Green Office Challenge has over 400 businesses, representing more than 70 million square feet of office space, participating in the program. The City plans to continue the program for a second year to enable participants to fully implement their sustainability initiatives. The program also will be expanded to include other businesses, including NASA's Johnson Space Center and the Houston Independent school District. In 2011, Mayor Annise Parker, and the Houston Green Office Challenge and Energy Efficiency Incentive Program, were selected as the nation's top winner for large cities in the 2011 Mayors' Climate Protection Awards, an initiative sponsored by the U.S. Conference of Mayors. The annual awards program recognizes mayors for innovative practices in their cities that increase energy efficiency and reduce greenhouse gas emissions. In the first year, Green Office Challenge participants collectively reduced energy usage by 28 million kilowatt hours, reduced water usage by 74 million gallons, and more than 90 percent recycled in the office, diverting 40 percent of waste from the landfill. Also, the City is a community partner in the DOE's Better Buildings Challenge. Houston has committed 30 million square feet with a 20% energy reduction goal by 2020. On the municipal side, the City will be committing 7 million square feet and encouraging commercial property management firms and property owners to participate as well.
Other: Bike Share		The City launched its bike share program, Houston Bike Share, in May 2012, which is an active transportation alternative

Emissions reduction activity	Projected emissions reduction over lifetime (metric tonnes CO2e)	Action description
		<p>for the City. Houston's initial phase has been successful and, received funding support from Blue Cross Blue Shield TX and the US Department of Energy, totaling nearly \$2 million. On April 3, 2013, Houston B-cycle, expanded from 3 to 21 stations and from 18 to 175 bicycles. This Phase II expansion creates a presence not only in Downtown, but also in the East End, Heights, Midtown, Montrose and the Museum District/Hermann Park with four of the stations located at key METRORail stops. Phase III expansion discussions and planning include the Texas Medical Center and local universities, as well as additional neighborhoods. Pollution, traffic, and rising oil costs are just a few of the reasons why Houstonians need options for getting around. By the end of 2013, there were 29 stations and 227 bicycles. <a href="http://www.houston.bcycle.com">www.houston.bcycle.com</a></p>
Transport > Improve fuel economy and reduce CO2 from motorized vehicles		<p>The City has installed many electric vehicle charging stations - some for municipal use and some for public use. 28 Blink charging stations were installed for public use, many in parks and libraries, in 2011 and 2012 using grant funding. The City has been working with Ecotality on the EV Project and will be installing another 68 Blink charging stations in 2013, mostly for public use. It also has 25 Gridbot and 15 Chargepoint charging stations for municipal fleet use only. Electric vehicle supply equipment companies have also been working with private businesses to install charging stations in parking lots for public use.</p>
Urban Land Use > Urban agriculture		<p>In November 2012, the City launched the Urban Grows initiative. Urban Grows, part of the City of Houston's Healthy Houston initiative, aims to help communities build vegetable gardens, farms and orchards on vacant land in areas with poor access to healthy fresh foods, often referred to as food deserts. The City of Houston will provide lots through its LARA program (Land Assemblage Redevelopment Authority), which works to redevelop tax-delinquent and abandoned properties. Community members, partnering with local non-profits, foundations or churches, will then work to transform these vacant lots into usable, productive and attractive green spaces. Urban Grows is the first initiative launched as part of Mayor Parker's new program, Healthy Houston, which is designed to reduce obesity and increase healthy eating and exercise. Healthy Houston will promote programs, policies and actions designed to reduce food deserts, promote the availability of locally-grown foods, encourage the development of sustainable food systems and promote recreational opportunities. Urban Grows will:</p> <ul style="list-style-type: none"> <li>• Encourage urban agriculture in neighborhoods, utilizing vacant City property</li> <li>• Improve access to healthy, affordable and locally produced food for all neighborhoods</li> <li>• Support education regarding the benefits of sustainable agriculture</li> </ul> <p>Urban Grows will complement the City's existing efforts, including the launch of the City Hall Farmers Market and farmers markets at the City's multi-service centers; new vegetable container gardens downtown and throughout the City; a Grocery Access Task Force that works with grocers on providing economic tools and incentives to help spur more supermarket and grocery development in areas where they are needed; the launch of Bike Share in Houston and the expansion of bike lanes and trails.</p>
Urban Land Use >		<p>Also, in November, 2012, city voters passed a bond referendum for the Bayou Greenways Initiative. Over the next ten</p>

Emissions reduction activity	Projected emissions reduction over lifetime (metric tonnes CO2e)	Action description
Greenspace and/or bio-diversity preservation and expansion		<p>years, the Bayou Greenways will add 4,000 acres of new and equitably distributed green spaces that can also serve the function of flood control and storm water quality enhancement. It will also complete 300 miles of continuous all-weather hike and bike trails that will meander through those greenways — an amenity unparalleled in the nation. Developing green corridors along the bayous with connected trails bring a smart and sustainable resolution to alleviate the City's green space and flooding challenges. There are numerous other benefits associated with utilizing the City's bayou corridors for green space and recreation:</p> <ul style="list-style-type: none"> <li>• Reduced doctor visits due to increased access to recreation opportunities;</li> <li>• Increase in use of alternative transportation for commuting along the hike and bike trails;</li> <li>• Increase in property values along the corridor resulting in increased revenue to the city;</li> <li>• Increased flood prevention due to the opportunity for wet-bottom detention areas in the newly created green spaces;</li> <li>• Increased water quality due to the simple plantings located strategically along the bayous, the wet-bottom detention ponds, and reduced runoff;</li> <li>• Increased air quality due to increased CO2 sequestration by newly planted trees and grasses, and use of trails for alternative transportation; and</li> <li>• Change in Houston's image to attract the best and brightest to our city.</li> </ul> <p><a href="http://www.houstonparksboard.org/projects/bayou_greenways_initiative.php">http://www.houstonparksboard.org/projects/bayou_greenways_initiative.php</a></p>
Waste > Recycling or composting collections and/or facilities		<p>The City is proposing a new technological innovation, One Bin for All, that will allow residents to discard all materials in one bin, treating "trash" as valuable assets, dramatically increasing recycling using game changing technologies. This innovation was chosen by Bloomberg Philanthropies as one of 5 winners (out of 305 submissions) of the Mayors Challenge, a competition to incentivize innovation in city government and improve citizens' lives. This cost-neutral, technological innovation is a paradigm shift, changing how people think about waste and recycling. The concept of "trash" will be extinct and replaced by an understanding that all discarded material has value and can be recycled. Houston will apply proven technologies and new processes, redefining municipal solid waste from a liability to a valuable asset. This first-of-its-kind innovation uses technology in a way that has never been done before. This approach has the potential for cities across the globe to reduce greenhouse gas emissions, save money and create high value materials. Houston's innovation will:</p> <ul style="list-style-type: none"> <li>• Provide every residence with curbside One Bin for All services;</li> <li>• Decrease the volume of waste sent to landfills;</li> <li>• Reduce air pollution; and,</li> <li>• Manage waste and recycling costs. Houston will divert up to 75% of its waste.</li> </ul> <p>Houston has evidence the technology can work, significantly increasing its recycling rate at a price that is affordable. For more information, please visit <a href="http://www.huffingtonpost.com/annise-parker/mayors-challenge-houston-_b_2711153.html?utm_hp_ref=fb&amp;src=sp&amp;comm_ref=false">http://www.huffingtonpost.com/annise-parker/mayors-challenge-houston-_b_2711153.html?utm_hp_ref=fb&amp;src=sp&amp;comm_ref=false</a>.</p>
Transport > Improve bus infrastructure, services, and operations		<p>Also, the METRO is in the process of redesigning the existing bus system. The System Reimagining project represents a fresh look at METRO's bus network and how it can best meet the goals for transit in our region. System Reimagining first seeks to define overall goals for the bus system then design a system with individual routes to meet those goals. By considering an integrated network of bus routes with the expanding rail service – including route alignment, frequency of</p>

Emissions reduction activity	Projected emissions reduction over lifetime (metric tonnes CO2e)	Action description
		<p>service, potential connections, and improved links to development patterns – the system can be optimized to provide better service. Through this process, METRO seeks to make the system easier to use, and more useful to more people. The benefits should become evident – to existing and potential riders – leading to more trips by more people on public transit service. A chance for public comment and feedback on the proposed plan is planned for May 2014. Also, the Passenger Bus Shelter Program is an initiative to install bus shelters throughout the METRO service area. Installation of shelters has been shown to increase ridership at a given bus stop by an average of 20 additional riders per day. The Board is funding 100 new bus shelters per year.</p>
<p>Transport &gt; Awareness and education for non-motorized transport</p>		<p>In May 2013, Mayor Annise Parker and Houston City Council Members unanimously approved an ordinance to protect Houston’s cyclists and other vulnerable road users by requiring cars and other motor vehicles to keep a separation of more than three feet while passing, and trucks or commercial vehicles to keep a separation of more than six feet. The ordinance is effective immediately. Vulnerable road users are defined as a walkers or runners; the physically disabled, such as someone in a wheelchair; a stranded motorist or passengers; highway construction, utility or maintenance workers; tow truck operators; cyclists; moped, motor-driven cycle and scooter drivers; or horseback riders. “As a city, we need to protect everyone and anyone who uses our roads,” said Mayor Annise Parker. “This ordinance will make our city even more attractive to those who want to enjoy traveling in forms other than by car.” In addition to requiring safe passing and trailing distances from vulnerable road users, this ordinance prohibits any motor vehicle occupant from throwing or projecting any object or substance at or against them. Similar ordinances have already been enacted by Austin, Fort Worth and San Antonio. The Safe Passing ordinance is another initiative, led and/or supported by Mayor Parker, to encourage more cycling in Houston. Others include the launch of Houston Bike Share, closing gaps in Houston’s bike trail system; the voter-approved Bayou Greenways initiative; and approval of HB200, which will allow Houston’s utility easements to be used for hike and bike trails.</p>
<p>Food &gt; Promotion of climate smart eating habits</p>		<p>The City Hall Farmer's Market returned for the fifth year at the beginning of 2014. The public is able to enjoy a variety of locally prepared ready-to-eat or packaged to-go foods, pick up farm-fresh weekly groceries and at the same time support sustainable food, all amidst Houston’s dramatic downtown urban setting. The City Hall Farmers Market features more than 30 vendors (located along both sides of City Hall’s reflection pool), including local fresh produce grown by local farmers, cheeses, breads, roasted coffees, and a variety of prepared meals, as well as food trucks.</p>
<p>Transport &gt; Infrastructure for non-motorized transport</p>		<p>In October 2013, at the site of Texas’ first certified GreenRoads projects in Midtown, Mayor Annise Parker unveiled a transformative new approach for Houston streets that will accommodate the needs of all users, not just those behind the wheel. The mayor’s Complete Streets and Transportation Plan is meant to provide safe, accessible and convenient use by motorists, public transit riders, pedestrians, people of all abilities and bicyclists. The new policy, detailed in a draft executive order from the mayor, will be achieved over time as improvements to existing roadways and redevelopment</p>

Emissions reduction activity	Projected emissions reduction over lifetime (metric tonnes CO2e)	Action description
		<p>occur. "This executive order is a major first step forward," said Mayor Parker. "Many groups have worked hard to get us to this point, including The Complete Streets Coalition, Scenic Houston, AARP and BikeHouston. I am thankful for their input and steadfast commitment. Houston is a city that embraces its diversity. This Complete Streets policy applies the same approach to our mobility system by meeting the diverse needs of all Houstonians while also creating more accessible and attractive connections to residential areas, parks, businesses, restaurants, schools and employment centers. The Complete Streets and Transportation Plan recognizes that all streets are different. The function of the road, current and projected adjacent land use and travel demands, availability of right-of-way, community input and the level of vehicular, pedestrian and bicycle traffic must all be considered in decisions regarding enhancements. The ultimate goal, where appropriate, is walkable and bike-friendly neighborhoods with amenities such as trees and landscaping, public art and street furniture. "As we work to build a healthier community, it is more important than ever to reimagine our approach to streets, sidewalks, pedestrian crossings, public transit, bike trails and lanes," said Mayor Parker. The Plan will build upon and utilize tools such as the city's Mobility Planning already underway. It will create new definitions found in the city's Major Thoroughfare and Freeway Plan Policy Statement and the Infrastructure Design Manual. The city's Rebuild Houston program will also ensure that all future roadway construction utilizes the principals contained in the mayor's Complete Streets Executive Order.</p>
Finance > Instruments to fund low carbon projects		<p>The City of Houston's 5-Star program got underway in 2010 with economic stimulus funding from the American Recovery and Reinvestment Act. Under the management of HARC (the Houston Advanced Research Center) 59 new, single-family houses were completed through the initiative's end in September 2013. "5-Star is unique in the way it incentivizes builders to upgrade new housing to reach ultra-efficiency levels well above Energy Star," a key federal program that promotes energy-efficient products and practices, said David Hitchcock, the member of HARC's research staff who has directed the management of the 5-Star program. "Larger incentives have been provided to motivate builders to reach higher efficiency levels, with those homes receiving the 5-Star rating receiving the largest incentive," Hitchcock said. "Most of the energy savings in achieving these ultra-high efficiency levels have been obtained through installation of solar panels." This program represents an expansion and enhancement of a local house-building program that already existed. In a 2010 progress report, city officials described this existing program, a component of the Houston HOPE program, as an "effort to revitalize blighted but historic neighborhoods by creating new affordable homes in areas with high concentrations of abandoned lots." Partnering with a local government authority, the city acquired tax-delinquent properties for redevelopment through Houston HOPE. Six private homebuilders and one non-profit organization in turn acquired sites for new, affordable, single-family homes, which have been upgraded for much greater energy efficiency under the 5-Star program. Besides solar installations, other areas where builders attained greater efficiency have included water heating, attic insulation, duct placement and selection of appliances. Receiving a rating of five stars (20-0</p>

Emissions reduction activity	Projected emissions reduction over lifetime (metric tonnes CO2e)	Action description
		on the HERS index) has earned a builder incentive of \$50,000. The smallest incentive (for a one-star HERS rating of 45-36) was \$25,000. For the houses built to date, the total annual energy savings that are possible for residents is estimated at about \$2,100 each compared with a conventional house. For all those houses combined, the annual reduction in emissions of climate-changing carbon dioxide from power plants is estimated at about 368 tons.
Finance > Instruments to fund low carbon projects		The Residential Energy Efficiency Program (REEP) provides income-qualified Houstonians the opportunity to receive the implementation of weatherization measures for their homes at no charge. The City of Houston receives an annual funding allocation from Centerpoint Energy for this program. These funds help to reduce energy consumption for Houstonians by installing energy efficiency upgrades such as CFL light bulbs, door weather-stripping, caulking, wall and attic insulation, air conditioners, HVAC system upgrades, refrigerators, solar screens and more. The efficiency upgrades are based on a custom assessment of each home that will determine the measures needed to make the home more energy efficient. This assessment and audit tool (NEAT) is the national standard audit process recognized by the Department of Energy (D.O.E) and the State of Texas. The audit assessment and installation of the energy efficiency measures are done at no cost to homeowners. Additionally, this program allows the City to create opportunities for local contractors while simultaneously educating residents on how to create a healthy and energy efficient environment in their home. Over 13,000 homes have benefited from REEP.
Transport > Improve fuel economy and reduce CO2 from bus and/or light rail		METRO operates 400 diesel-hybrid electric buses, which accounts for 1/3 its fleet. All METRO buses are programmed to automatically shut down after 20 minutes of idling.

Does your city have a renewable energy or electricity target?

Yes - my city has a renewable energy target

8.1a

Please indicate the energy mix of your electricity at the city-wide scale.

Energy source	Percent
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8.1b

Please provide details of your renewable electricity targets and how the city plans to meet those targets.

Scale	Total installed capacity of renewable electricity (in MW)	Proportion of total electricity from renewable energy sources	Target Date	Plans to meet target (include details on types of energy)
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8.1c

Please provide details of your renewable energy targets and how the city plans to meet those targets.

Scale	Total installed capacity of renewable energy (in MW)	Proportion of total energy from renewable energy sources	Target Date	Plans to meet target (include details on types of energy)
Municipal	140	50%	2015	The City of Houston has signed an agreement with Reliant Energy, an NRG Energy company, to purchase over 140 MW of renewable power for the next two years. From July 1, 2013 through June 30, 2015, the City's purchase of green power will account for half of its annual electricity demand. The City will be using almost 623,000 mWh of green power per year, which is equivalent to the amount of kilowatt-

Scale	Total installed capacity of renewable energy (in MW)	Proportion of total energy from renewable energy sources	Target Date	Plans to meet target (include details on types of energy)
				hours needed to power over 55,000 homes each year. This purchase puts Houston as the largest municipal purchaser of renewable power in the U.S., and in the top 10 overall in the nation, according to EPA estimates. The City has purchased renewable energy credits (RECs) that are Green-E certified. Taking advantage of more cost effective and cost competitive REC prices, the City has maintained a relatively flat power price while also increasing its percentage of renewable energy in its portfolio. The City has committed \$2 million for this 2-year agreement.

## 8.2

Please explain why you do not have a renewable energy or a renewable electricity target and any plans to introduce one in the future.

## 8.3

**List any climate change-related projects for which you hope to attract private sector involvement.**

The City of Houston constantly strives to keep solar at the forefront of its sustainability vision, striking a balance between increasing market growth and decreasing regulatory barriers. With existing installations at the George R. Brown Convention Center, City Hall Annex, Discovery Green, and most recently, the Houston Permitting Center, the City is a test bed for solar technologies.

The City's 5-Star Program is a creative way to couple renewable energy systems and energy efficiency projects. The 5-Star Program "sustainably" reinvests in Houston's historic neighborhoods. Builders receive incentives to build energy efficient homes and add photovoltaics and solar thermal as upgrades to these newly completed homes.

The Houston Green Office Challenge invites commercial office owners/managers and tenants in Houston to increase their environmental and economic performance in cleaner transportation choices, energy conservation, property management/tenant engagement, water efficiency and waste reduction. The City is a community partner in the DOE's Better Buildings Challenge. Houston has committed 30 million square feet with a 20% energy reduction goal by 2020.

The DOE has recently described the City of Houston as a leader in weatherization through the Residential Energy Efficiency Program (REEP). The City received \$23 million from the DOE to help thousands of Houston residents. Centerpoint and the City of Houston have partnered to continue the program in 2013.

The City has launched Houston Drives Electric, the City's comprehensive municipal and public electric vehicle readiness initiative. The City of Houston now has 27



Nissan Leafs in the city vehicle fleet, bringing the total to 42 electric and plug-in hybrid fleet vehicles. The City has completed an EV deployment plan, installed numerous charging stations in public locations, offers 24 hour permitting for residential charging stations and is working on additional incentives to spur adoption of EV technology.

In April, 2013, the City expanded Houston Bike Share to encourage biking in Houston. Houston now has nearly 230 bikes and 30 kiosks throughout downtown and adjacent neighborhoods (Montrose, Midtown, East End and the Museum District). Phase III expansion plans include bike share kiosks at the city's universities, the Texas Medical Center and additional neighborhoods.

The City passed a Safe Passage ordinance in 2013 to keep bicyclists and pedestrians safer on city streets, and encourage more outdoor activity. On-street bike lanes and cycle-tracks are also being worked on as part of the City's commitment to Complete Streets.

Over the next ten years, the Bayou Greenways Initiative will add 4,000 acres of new and equitably distributed green spaces that can also serve the function of flood control and storm water quality enhancement. It will also complete 300 miles of continuous all-weather hike and bike trails that will meander through those greenways — an amenity unparalleled in the nation.

The City of Houston won a Bloomberg Philanthropies Mayors Challenge grant award to implement One Bin for All, a program which will allow residents to discard all materials in one bin, treating trash as valuable assets, dramatically increasing recycling using game changing technologies. This cost-neutral, technological innovation is a paradigm shift, changing how people think about waste and recycling. This first-of-its-kind innovation uses technology in a way that has never been done before.

The City Gardens and Farmers Market Initiative supports urban gardens and markets that inspire and empower people of diverse backgrounds to grow, eat and buy local and organic food. The initiative improves health and nutrition, creates community and supports valuable local businesses that together sustain and improve the environment.

The City also launched in October, 2013, Urban Grows. The City now provides the use of City land for neighborhood allotment gardens. The first allotment garden using this new model was built in the Sunnyside neighborhood.

In March 2014, the City announced its SundayStreetsHTX Pilot Program. Opening streets to pedestrians, bicyclists and families encourages communities to be physically active and to consider using alternative transportation options in the future. SundayStreetsHTx will open White Oak, Westheimer and Washington/Market Square to bicyclists and pedestrians on the first Sundays in April, May and June 2014, respectively.

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#### 8.4

**Does your city incorporate desired GHG reductions into the master planning for the city?**

Yes

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#### 8.4a

**Please describe the ways that the master plan is designed to reduce GHG emissions.**

As the fourth largest city in the US, and an array of new residents moving to Houston every day, the development of a Framework which promotes a more sustainable and targeted approach to Houston's current development practices is vital to the greater success of the region as a whole. Neighborhoods that promote "live, work, and play" amenities are desirable ways to encourage economic development, promote housing choices/styles, reduce the need for a car all while creating pedestrian-friendly corridors and providing renewed sense of interest in a community's identity. As such, the purpose of the Urban Houston Framework study was to develop a comprehensive Toolbox of policy and regulatory incentives that Houston can use to strategically encourage dense, sustainable Urban Centers in appropriate locations, while maintaining the character of existing neighborhoods.

The intent of the Framework is to help integrate land use and transportation planning by coordinating land development standards with new transit investments, and by providing affordable housing in dense areas around new transit lines.

The result of this study is a 4-part framework that will help guide the City in the development of responsible, policies, tools, and incentives that may be used by developers, citizens and the community at large for responsible, sustainable development throughout Houston.

The result is an Urban Center Framework that consists of four general categories:

- Urban Center Characteristics and defined criteria
- Tools provided to help developed desired Urban Center Vision
- Expectations associated with accessing those tools
- Process for becoming and acquiring access to provided tools

## **Page: Water Supply Risks**

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**9.0**

**Do you foresee substantive risks to your city's water supply in the short or long term?**

Yes

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**9.0a**

**Please identify the risks to your city's water supply as well as the timescale.**

Risks	Timescale	Risk level	Risk description
Inadequate or aging infrastructure	Medium-term	Less serious	During the extreme drought in 2011, a combination of hot weather and aging water pipes caused 700 breaks a day along 7,000 miles of pipes in Houston. The pipes were breaking due to being weakened and corroded with age and soil too dry to handle the expansion of the pipes. Without the soil against the pipes to help contain the pressure, the pipes broke.

**Page: Water Supply Adaptation**

**Please note**

If you did not select anything in the dropdown list for Q9.0 on the Water Supply Risks page, nothing will be displayed on this page. Please go back to the Water Supply Risks page to confirm your choice or go to the Home page to proceed to submission.

**9.0b**

**Please explain why you do not consider your city to be exposed to any substantive water-related risk**

**9.1**

**Please describe the actions you are taking to reduce the risks to your city's water supply.**

Risks	Adaptation Action	Action Description
Inadequate or aging infrastructure	Investment in existing water supply infrastructure	<p>Utility Customer Service is authorized to charge rates and fees as set by Chapter 47 of the City of Houston Code of Ordinances. Per state law, the City of Houston must charge fairly for water and sewer services. This means that water and sewer billing must cover the costs of: -Acquisition, treatment, and delivery of water to the tap -Removal and treatment of sewage -Maintenance and improvements to the water and sewer systems To cover increasing costs, water and sewer rates are adjusted each year in April to reflect the previous year's percentage change to the Producer Price Index (PPI). In 2014, the rate change will equal the PPI of 1.2% over the 2013 rates. City of Houston Ordinance 2010-305 requires the Combined Utility System (CUS) to implement an annual rate adjustment to be effective April 1st of each year. The required water and wastewater rate adjustment under this ordinance for April 1, 2013 is 3.6%. This rate adjustment is based on the regional Consumer Price Index increase plus population percentage growth for Houston. The 2010 ordinance also deferred half of the total increase in single family residential rates, to be implemented across 2011 through 2013. This year, in addition to the 3.6% annual rate adjustment, water and wastewater rates will have a final cost of service adjustment of 5.3% for a total of 8.9%. This increase will bring single family residential water and wastewater rates in line with actual cost of service. This annual rate adjustment is intended to help cover cost increases that impact the provision of safe, clean drinking water and the collection and treatment of wastewater. This includes operational costs as well as the costs involved in the repair and replacement of portions of the System's aging infrastructure.</p>

CDP