



## CDP Cities 2016 Information Request City of Houston

### Module: Introduction

#### Page: Introduction

##### 0.1

Please give a general description and introduction to your city including your city's boundary in the text box below.

Administrative boundary	Description of city
City/Municipality	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.

##### 0.2

#### Emissions Accounting Choice

Reporting emissions is optional for all cities. By checking the boxes below you are indicating that you have fuel and/or greenhouse gas (GHG) emissions data to report at this time.

Select 'Government' to report emissions from your local government operations (sometimes referred to as 'corporate' or 'municipal' emissions).

Select 'Community' to report emissions from the entire city area over which the city government can exercise a degree of influence through the policies and regulations they implement (sometimes referred to as 'geographic' or 'city-wide' emissions).

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

IF YOU HAVE NO FUEL AND/OR GREENHOUSE GAS EMISSIONS TO REPORT DO NOT CHECK EITHER BOX.

Government  
Community

### Module: Governance

#### Page: City Details

##### 0.3

Please provide information about your city's Mayor in the table below.

Leader title	Leader name	Current term start	Current term end	Total time in office (years)
Mayor	Sylvester Turner	2016	2019	0

##### 0.4

Please provide details of your city's annual operating budget.

Annual operating budget	Currency	Budget year start	Budget year end
5100000000	USD US Dollar	Wed 01 Jul 2015	Thu 30 Jun 2016

##### 0.5

Please provide details of your city's current and projected population.

Current population	Current population year	Projected population	Projected population year
2195914	2013	3370900	2040

##### 0.6

Please provide details of your city's GDP.

GDP	Currency	Year of GDP	Source
51740000000	USD US Dollar	2014	<a href="https://www.houston.org/pdf/research/quickview/employment-forecast.pdf">https://www.houston.org/pdf/research/quickview/employment-forecast.pdf</a>

##### 0.7

Please provide further details about the geography of your city.

Average annual temperature (in Celsius)	Land area (in square km)	Average altitude (m)	Longitude (e.g. -120.9762)	Latitude (e.g. 41.25)
21	1625	13	-95.3698	29.7604

**Page: Governance**

**1.0**  
Please describe the impact of national and/or regional climate change activities on your city's own climate change activities.

On a regional level, the 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))

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.

**1.1**  
Does your city incorporate desired sustainability goals and targets (e.g. GHG reductions) into the master planning for the city?

Response	Description
Yes	Houston faces many challenges, including managing growth, maintaining infrastructure, enhancing neighborhoods and overcoming fiscal hurdles. In 2014, the City's Planning and Development Department began developing Plan Houston, Houston's first general plan, to address these challenges. Through early 2015, the project team, including three community leadership committees, engaged Houstonians to develop a draft community vision and goals statement. In June 2015, the City released core strategies for public input. These strategies identify the City's priorities for achieving the community vision. This plan was developed by looking at prior planning efforts, then listening to residents and community leaders who described their image of a successful Houston. City Council approved the plan in September 2015. Twelve core strategies, the result of significant input from stakeholders throughout the community, represent proposed priorities that the City should pursue in order to achieve the community's vision and goals.

**1.2**  
Please describe how your city collaborates with businesses in your city on sustainability issues or projects?

The City relies heavily on its public private partnerships to advance its sustainability goals and projects.

In 2014, Houston's transmission and distribution utility, CenterPoint Energy, in partnership with the City of Houston, began converting 165,000 streetlights from to LED technology. This project increases public safety and reduces GHG emissions by 5%, energy use by 50%, and energy costs of \$28 million. In addition, an agreement has been reached that will allow hike and bike trails along CenterPoint's utility ROWs. CenterPoint committed \$1.5 million to build the first leg of the trails. CenterPoint has supported city programs, including, the Houston Green Office Challenge and the Residential Energy Efficiency Program, providing financial and educational support.

Shell has financially supported the Houston Green Office Challenge and has organized a Powering Progress Together event, where public and private sector thought leaders engaged in a dialogue about future energy challenges. Funded by Reliant, the Beat the Heat Program evolved with the Houston Department of Health to respond to the need for relief from Houston's extremely hot summers. Cigna has supported the City's Cigna Sunday Streets events where streets are opened to bicyclists, pedestrians, and families and closed to car traffic.

**Module: Risks & Adaptation C40**

**Page: Cities-C40-ClimateHazards**

**2.0**  
Has a climate change risk or vulnerability assessment been undertaken for your local government area?

In progress

**2.1**  
Do the current and/or anticipated effects of climate change present a significant risk to your city?

Yes

**2.1a**  
Please list the most significant climate hazards currently faced by your city and indicate the probability and consequence of these hazards.

Climate hazards	Probability of hazard	Consequence of hazard
Extreme hot days	Medium High	Medium High
Drought	High	High
Heat wave	High	Medium High
Flash/surface flood	High	High
Tropical storm	High	High
Storm surge	High	High

**2.1c**  
Please identify how you expect climate change to affect the frequency and intensity of the hazards faced by your city and when you expect to experience those changes.

Climate hazards	Change in frequency	Change in intensity	Anticipated timescale
Extreme hot days	Increasing	Increasing	Current
Drought	Increasing	Increasing	Current
Heat wave	Increasing	Increasing	Current
Flash/surface flood	Increasing	Increasing	Current
Tropical storm	Increasing	Increasing	Current
Storm surge	Increasing	Increasing	Short-term

Page: Climate Hazards II.

**2.1d**  
Please describe the magnitude of the impact of these hazards and identify three critical assets or services that may be most impacted.

Climate hazards	Magnitude of impact	Impact description	Asset or service	Asset or service	Asset or service
Extreme hot days	Serious	Extreme hot days 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. Increased energy usage also means increased water usage for the energy production at power plants.	Energy	Health and community	Water
Drought	Serious	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.	Water	Food and agriculture	Transport
Heat wave	Serious	Heat waves 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. Increased energy usage also means increased water usage for the energy production at power plants.	Energy	Health and community	Water
Flash/surface flood	Serious	Flooding can disrupt mobility, damage buildings and assets in the community and increase risk of a water-borne illnesses.	Transport	Health and community	Water
Tropical storm	Serious	Tropical storms can disrupt mobility, damage buildings and assets in the community and disrupt the power supply to homes and buildings.	Transport	Water	Energy
Storm surge	Serious	Storm surges can disrupt mobility, damage buildings and assets in the community and increase salt water intrusion and affect water quality.	Transport	Commerical	Water

**2.2**  
Do you consider that the effects of climate change could threaten the ability of businesses to operate successfully in your city?

Response	Explanation
Yes	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. In 2015, Houston experienced a major flood event over Memorial Day weekend. Ten days of rain prior to May 25th saturated much of the city and had the bayous running high. On May 25th, 11 inches of rain fell with some areas seeing one inch every ten minutes. The result was 4,000 homes damaged, 750 vehicles abandoned, and 7,300 claims made to FEMA. The City launched the Houston Volunteer Disaster Assistance Initiative to quickly identify and assist elderly, disabled and low-income residents with disaster clean-up. This storm also pointed to the ongoing challenge of providing a more effective real-time warning to citizens of flooding dangers.

Page: Adaptation C40

**3.0**  
Please describe the process by which the city reviews its progress and manages overall responsibility for climate change adaptation.

Progress on climate change adaptation projects, in relation to infrastructure upgrades, are reported annually with a list of completed projects. Future changes are built into the capital improvement plan. For strategies dealing with emergency preparedness, the City's Office of Emergency Management provides programs and activities to City residents and departments to help them prepare for, cope with and recover from the effects of natural and manmade disasters through all four phases of emergency management: preparedness, response, recovery and mitigation. Climate change adaptation indicators or metrics for city operations are still being developed.

**3.1**  
Has the Mayor or local government committed to adapting to climate change across the geographical area of the city, town or settlement?

In progress

**3.2**  
Does your local government have a plan that addresses climate change adaptation?

In progress

**3.2b**  
Please explain why not and/or any future arrangements you have to create a plan.

The City will be developing a plan once funding is available. The City has submitted grant applications to find assistance with creating a plan.

3.3

The Compact of Mayors requires cities to complete [these additional questions](#) on the climate hazards affecting your city and your city's plans to adapt to these hazards. Other cities wishing to disclose further detail about their adaptation efforts are also encouraged to fill out the download.

3.4a

Please describe the actions you are taking to reduce the risk to, or vulnerability of, your city's infrastructure, citizens, and businesses from climate change as identified in the Climate Hazards section.

Climate hazards	Action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Extreme hot days	Cooling centers, pools, water parks/plazas	Programme/Project	Currently in effect (city-wide)	Yes	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 six 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 2014, there were 21,563 visitors in the five Centers. Around 50% 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. The program also provides 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 2014, 233 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.
Drought	Maintenance/repair – leaking infrastructure	Programme/Project	Currently in effect (city-wide)	Yes	The City of Houston Water Conservation Plan 2014 highlights water conservation goals and continuous progress that will preserve long-term water supplies for the City of Houston and the greater Houston region. Water supply planning is important to the City of Houston in order to meet long term growth in demand and to comply with 30 TAC Chapter 288 that requires the City to prepare and implement a water conservation plan that meets certain requirements. This plan includes information to fulfill these requirements in addition to information specific to the City of Houston's water supply and treatment system. The current plan includes measures to be taken internally at the City of Houston as well as programs for water customers. These include current programs such as an in-house public education program, continued enforcement of water-wise building and plumbing codes and the Consumption Awareness Program designed to allow water customers to determine the most effective methods to maximize water-use efficiency inside and outside the home through communicating real-time meter data to household users. This document also summarizes plans to develop an internal Water Loss Program, pilot a Mainline Leak Detection Program and expand the Consumption Awareness Program.
Heat wave	Cooling centers, pools, water parks/plazas	Programme/Project	Currently in effect (city-wide)	Yes	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 six 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 2014, there were 21,563 visitors in the five Centers. Around 50% 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. The program also provides 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 2014, 233 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.
Flash/surface flood	Additional reservoirs and wells for water storage	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Bayou Greenways 2020 is a \$220 million project that is a public-private partnership between Houston Parks Board, the Houston Parks and Recreation Department and the Harris County Flood Control District. When complete, Houston will have added more than 3,000 acres of new and equitably distributed green spaces that can also serve the function of flood control and storm water quality enhancement. We will have also completed 80 new miles of continuous all-weather hike and bike trails that will meander through those greenways — an amenity unparalleled in the nation — that will provide a total network of 150 miles of greenspace and trails crisscrossing the city. When the project is complete, approximately 60 percent of Houstonians will live within 1.5 miles of a Bayou Greenway. There are numerous other benefits associated with utilizing our bayou corridors for green space and recreation: • Reduced doctor visits due to increased access to recreation opportunities; • Increase in use of alternative transportation for commuting along the hike and bike trails; • Increase in property values along the corridor resulting in increased revenue to the city; • Increased flood prevention due to the opportunity for wet-bottom detention areas in the newly created green spaces; • Increased water quality due to the simple plantings located strategically along the bayous, the wet-bottom detention ponds, and reduced runoff; • Increased air quality due to increased CO2 sequestration by newly planted trees and grasses, and use of trails for alternative transportation; and • Change in Houston's image to attract the best and brightest to our city. <a href="http://houstonparksboard.org/bayou-greenways-2020/2020/">http://houstonparksboard.org/bayou-greenways-2020/2020/</a>
Tropical storm	Storm water capture systems	Programme/Project	Currently in effect (city-wide)	Yes	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. Since the start of ReBuild Houston, the Public Works & Engineering Department has reconstructed 349 miles and rehabilitated 561 miles. In all, ReBuild Houston is responsible for more than 900 miles of roadway improvements across the City. In the upcoming five-year Capital Improvement Plan, PWE with funding from ReBuild Houston plans to: • Rehabilitate or reconstruct make more than 483 miles of roadway • Place more than 1.3 million feet (246 miles) of sidewalks throughout the city • Add more than 20,288 feet of on-street bikeways and off-street trails • Add 1,025 curb ramps as part of its safe sidewalks program • Make 154 miles of storm water drainage improvements • Build 4,663 storm water inlets • Add 8 acre feet of in-pipe detention which will hold more than 2.6 million gallons of storm runoff water <a href="http://www.rebuildhouston.org/">http://www.rebuildhouston.org/</a>

Climate hazards	Action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Storm surge	Storm water capture systems	Programme/Project	Currently in effect (city-wide)	Yes	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. Since the start of ReBuild Houston, the Public Works & Engineering Department has reconstructed 349 miles and rehabilitated 561 miles. In all, ReBuild Houston is responsible for more than 900 miles of roadway improvements across the City. In the upcoming five-year Capital Improvement Plan, PWE with funding from ReBuild Houston plans to: • Rehabilitate or reconstruct make more than 483 miles of roadway • Place more than 1.3 million feet (246 miles) of sidewalks throughout the city • Add more than 20,288 feet of on-street bikeways and off-street trails • Add 1,025 curb ramps as part of its safe sidewalks program • Make 154 miles of storm water drainage improvements • Build 4,663 storm water inlets • Add 8 acre feet of in-pipe detention which will hold more than 2.6 million gallons of storm runoff water <a href="http://www.rebuildhouston.org/">http://www.rebuildhouston.org/</a>

**Page: Adaptation II**

**3.4b**

Please provide some additional information on the adaptation actions you are taking.

Actions to reduce vulnerability	Which exchange most helped to deliver this action?	Primary (major) financial mechanism	Secondary financial mechanism	Total capital cost (\$USD)	Action start date (mm/yy)	Action end date (mm/yy)
Cooling centers, pools, water parks/plazas	None of the above	Grants / subsidies	City's own funds / savings	0 - 100.000	06/14	10/15
Maintenance/repair – leaking infrastructure	Working with non-C40 cities	City's own funds / savings	Tolls / user charges	10.000.001+	09/14	05/19
Cooling centers, pools, water parks/plazas	None of the above	Grants / subsidies	City's own funds / savings	0 - 100.000	06/14	10/15
Additional reservoirs and wells for water storage	None of the above	Bond issuance (municipal bonds, green bonds, infrastructure bonds)	Developer contributions	10.000.001+	06/13	06/20
Storm water capture systems	None of the above	Tolls / user charges	City's own funds / savings	10.000.001+	11/10	12/50
Storm water capture systems	None of the above	Tolls / user charges	City's own funds / savings	10.000.001+	11/10	12/50

**Page: Social Risks C40**

**4.0**

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

Yes

**4.0a**

Please complete the table

Social risks	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.
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 six 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 2014, there were 21,563 visitors in the five Centers. Around 50% 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. The program also provides 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 2014, 233 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.

**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 investment	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. Since the start of ReBuild Houston, the Public Works & Engineering Department has reconstructed 349 miles and rehabilitated 561 miles. In all, ReBuild Houston is responsible for more than 900 miles of roadway improvements across the City. <a href="http://www.rebuildhouston.org/">http://www.rebuildhouston.org/</a>
Improved efficiency of operations	In the City's municipal energy efficiency program, 6 million square feet of municipally-owned buildings are achieving guaranteed energy use reductions approaching 30% with paybacks of, on average, less than ten years. 18 libraries used Qualified Energy Conservation Bonds to fund additional municipal energy efficiency work.

**5.1**  
List any climate change-related projects for which you hope to attract private sector involvement, and provide any details on the estimated cost of the project

Project area	Project description	Cost of project (USD\$)
Renewable energy	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.	1000000
Energy efficiency/retrofit	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.	25000
Energy efficiency/retrofit	The Department of Energy 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 partnered to continue the program in 2014.	2000000

**Module: Emissions - Local Government Operations**

**Page: Local Government - Methodology**

**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.

Thu 01 Jan 2015 - Thu 31 Dec 2015

**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

**LGO1.2**  
Please indicate which of the following major sources of emissions are included in your municipal GHG emissions inventory.

Source of emissions	Status

Source of emissions	Status
Airport(s)	Included
Buildings	Included
Buses	Not applicable
Electricity generation	Not applicable
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
Unknown source	Not applicable
Total	Included

**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.

**LGO1.4**  
Which gases are included in your emissions inventory? Tick all that apply.

- CO2
- CH4
- N2O

**Further Information**

**Page: Local Government - Energy Data**

**LGO1.5**  
Please give the total amount of fuel (refers to Scope 1 emissions) that your local government has consumed this year.

Source	Fuel	Amount	Units
Airport(s)	Natural gas	5225650	Therms
Buildings	Natural gas	2192090	Therms
Wastewater treatment	Natural gas	6164160	Therms
Water supply	Natural gas	72060	Therms
Municipal vehicle fleet	Diesel/Gas oil	13191169	L
Municipal vehicle fleet	Motor gasoline (petrol)	24407489	L

**LGO1.6**  
How much electricity, heat, steam, and cooling (refers to Scope 2 emissions) has your local government purchased for its own consumption during the reporting year?

Source	Type	Amount	Units
Airport(s)	Electricity	109608224	kWh
Buildings	Electricity	152319934	kWh
Street lighting and traffic signals	Electricity	72146591	kWh
Wastewater treatment	Electricity	199814216	kWh
Water supply	Electricity	159414365	kWh

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

**LGO1.7**  
Please provide total (Scope 1 +Scope 2) GHG emissions for your local government's operations, in metric tonnes CO2e.

525928

**LGO1.8**  
If applicable, please provide the following GHG emissions.

**Scope 1: All direct GHG emissions**  
**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
165156	360772

**LGO1.9**  
Do you measure Scope 3 emissions?

Yes

**LGO1.9a**  
Please complete the table.

Source of Scope 3 emissions	Emissions (metric tonnes CO2e)	Comment
Waste Related Scope 3 Emission Sources	151215	The City could not retrieve CY2015 residential solid waste data. CY2014 data was used instead.

**LGO1.11**  
Where it will facilitate a greater understanding of your government emissions, please provide a breakdown of these emissions by department, facility, source, or by any other classification system used in your city.

Department / Facility / Source / Other	Scope	Emissions (metric tonnes CO2e)
Houston First: Buildings and Facilities	Total figure	17805
General Services, ARA, HITS, FMD, HPL, Health: Buildings and Facilities	Total figure	41962
Municipal Courts: Buildings and Facilities	Total figure	1226
Park & Recreation: Buildings and Facilities	Total figure	14864
Public Works: Buildings and Facilities	Total figure	14006
Houston Airport System: Buildings and Facilities	Total figure	84814
Solid Waste: Buildings and Facilities	Total figure	1052
Vehicle Fleet	Scope 1	92577
Street Lights	Scope 2	34783
Traffic Lights	Scope 2	2759
Water Delivery Facilities	Total figure	83337
Wastewater Facilities	Total figure	136743

**LGO1.12**  
Please indicate if 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 31% in 2015. This is attributable to decreased electricity usage and increased green power purchasing. There was a slight increase from calendar year 2014 to 2015, which could be attributable to double counting energy data in the reporting from IT and the retail electric provider.

**Page: Local Government - External Verification**

**LGO1.13**  
Has the GHG emissions data you are currently reporting been externally verified or audited in part or in whole?

No

**LGO1.13b**  
Please describe your plans to verify your emissions in the future.

With additional funding, the City will consider third party verification for future community GHG emissions inventories.

**Module: Emissions - Community**

**Page: Community - Date and Boundary****C1.0**

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

Wed 01 Jan 2014 - Wed 31 Dec 2014

**C1.1**

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

Administrative boundary of a local government

**Page: Community - GHG Emissions Data****C1.2**

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

Primary protocol	Comment
U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (ICLEI)	

**C1.3**

Which gases are included in your emissions inventory? Tick all that apply.

CO2  
CH4  
N2O

**C1.4**

Please detail total (Scope 1 + Scope 2) emissions for your community, in metric tonnes CO2e and provide a comment on the level of confidence in the accuracy of your community emissions figure.

Total emissions (metric tonnes CO2e)	Attach your inventory	Level of confidence	Comment on level of confidence
33428301		Medium	

**C1.5**

If applicable, please provide a breakdown of your GHG emissions by scope.

Scope	Metric tonnes CO2e	Level of confidence
Scope 1 emissions excluding emissions from grid-supplied energy generation	16075539	Medium
Scope 1 emissions from grid-supplied energy generation within the city boundary	2841500	Medium
Total Scope 1 emissions (Row 1 + Row 2)	18917039	Medium
Total Scope 2 emissions	14511262	Medium

**C1.6**

Where it will facilitate a greater understanding of your community's emissions, please provide a breakdown of these emissions by end user (buildings, water, waste, transport), economic sector (residential, commercial, industrial, institutional), IPCC sector (stationary combustion, mobile combustion, industrial processes, waste) or any other classification system used in your city.

End user / Economic sector / IPCC sector / Other	Sector	Scope	Emissions (metric tonnes CO2e)
All Buildings	Residential buildings	Scope 1	17352760
Transport	Transportation	Scope 1	16075539

**C1.7**

Please give the total amount of fuel (referring to Scope 1 emissions) consumed in your city during the reporting year.

Fuel	Amount	Units	End user / Economic sector / IPCC sector / Other	Sector
Natural gas	520460869	Therms	All buildings	Commercial buildings
Diesel/Gas oil	35251388.3	L	Freight Rail: Line-Haul	Rail
Diesel/Gas oil	115921119.3	L	Freight Rail; Switchyard	Rail
Diesel/Gas oil	137396938.8	L	Freight Trucks	Road
Diesel/Gas oil	666750314.5	L	Passenger Vehicles	Transportation
Motor gasoline (petrol)	4685388469.2	L	Passenger Vehicles	Transportation
Diesel/Gas oil	55962263.5	L	Transit	Transportation
Motor gasoline (petrol)	5405462	L	Transit	Transportation

**C1.8**

How much electricity, heat, steam, and cooling (referring to Scope 2) has been consumed by your city during the reporting year?

Type	Amount	Units	End user / Economic sector / IPCC sector / Other	Sector
Electricity	26095.7	GWh	All buildings	Commercial buildings

**C1.11**  
Do you measure Scope 3 emissions?

Yes

**C1.11a**  
Please complete the table

Source of Scope 3 emissions	Emissions (metric tonnes CO2e)	Comment
Waste	842488	

**C1.12**  
Please indicate if your emissions have increased, decreased, or stayed the same since your last emissions inventory, and please describe why.

Reason for change	Please describe why
This is our first year of calculation	We are using the same inventory we submitted last year, and that was our first year conducting a community-wide GHG inventory using the ICLEI Community Protocol.

**Further Information**

**Page: Community - External Verification**

**C1.13**  
Has the GHG emissions data you are currently reporting been externally verified or audited in part or in whole?

No

**C1.13b**  
Please describe your plans to verify your emissions in the future.

With additional funding, the City will consider third party verification for future community GHG emissions inventories.

**Module: Strategy C40**

**Page: GHG Emissions Reduction - Local Government C40**

**6.0**  
Do you have a GHG emissions reduction target in place for your local government operations?

Yes

**6.0a**  
Please provide details of your local government operations emissions reduction target.

Sector	Define target boundary	Baseline year	Baseline emissions (metric tonnes CO2e)	Percentage reduction target	Target date	Comment
Total	For all municipal operations	2007	985043	42%	Other: 2016	

**6.1**  
What actions are you undertaking to reduce your emissions in your local government operations?

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Buildings	Building performance rating and reporting	Institutional (municipal) buildings and facilities: Audits and advice	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Through performance contracting, a total of 6 million square feet of city facilities are expected to achieve guaranteed energy use reductions of 30%, saving over 22 million kWh of electricity every year, with paybacks of, on average, less than ten years.
Buildings	Building performance rating and reporting	Institutional (municipal) buildings and facilities: Benchmarking	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	The City of Houston has voluntary benchmarking programs, like the Houston Green Office Challenge and the DOE's Better Buildings Challenge, where commercial buildings can opt into disclosing their energy ratings to the City. The City is exploring energy efficiency policies for commercial buildings. The City is currently working on benchmarking over 300 City buildings in hopes of achieving Energy Star certification on as many as possible.
Buildings	Building performance rating and reporting	Institutional (municipal) buildings and facilities: Energy performance certification	Policy	Currently in effect (city-wide)	Yes	The City has a Green Building Resolution, which sets a target of LEED-Silver certification for new construction, replacement facilities and major renovations of city of Houston-owned buildings and facilities with more than 10,000 square feet of occupied space. The City of Houston has 26 LEED Certified projects with 5 projects under review or in the pipeline. The City also received ENERGY STAR Certification for its police headquarters in 2015.
Buildings	Building performance rating and reporting	Institutional (municipal) buildings and facilities: Net metering	Programme/Project	Currently in effect and being piloted	Yes	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 Green Building Resource Center provides leadership and education and shows real-time energy production of its rooftop solar panels. The center provides valuable resources to better inform the public when they are ready for solar, and citizens are able to learn what system works best in Houston's climate and location. The City is working on a program to build 30 MW of solar power to add to the City's renewable energy mix.
Buildings	Building performance rating and reporting	Institutional (municipal) buildings and facilities: Smart meters	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Over 2.2 million smart meters have been installed across Houston, allowing consumers to see their yearly, monthly or daily electricity use down to 15-minute increments at SmartMeterTexas.com, get near-real time usage or bill forecasts on an In-Home Display energy monitor, and benefit from new retail electric products and services such as pre-paid service, time-of-use rates, and energy analysis tools.
Buildings	Building performance rating and reporting	Institutional (municipal) buildings and facilities: Sub metering	Programme/Project	Currently in effect and being piloted	Yes	With the assistance of the EECBG funding the City is able to implement a high-tech energy management solution at City Hall, the City Hall Annex and the City Administration Building. The Smarte Building system will measure and analyze real-time energy consumption throughout each of the buildings. The system is designed to measure energy use for specific equipment and in many cases at an individual user level. The system will allow plant managers to tune their building automation system, as well as allow individual building occupants to more energy efficiently use their computers, peripherals and other office equipment.
Buildings	Energy efficiency/ retrofit measures	Institutional (municipal) buildings and facilities: Building energy management system	Programme/Project	Currently in effect and being piloted	Yes	Schneider Electric's Resource Advisor is being used to track usage a number of facilities that are part of energy savings performance contracts (ESPCs). There are 21 facilities in the platform and 3 three fire stations that will be added.
Buildings	Energy efficiency/ retrofit measures	Institutional (municipal) buildings and facilities: Energy performance contracting	Programme/Project	Currently in effect (city-wide)	Yes	Through performance contracting, a total of 6 million square feet of City facilities are expected to achieve guaranteed energy use reductions of 30%, saving over 22 million kWh of electricity every year, with paybacks of, on average, less than ten years. Both Siemens and Schneider Electric worked on the performance contracting.
Buildings	Building codes and standards	Institutional (municipal) buildings and facilities: Energy performance rating for new construction	Programme/Project	Currently in effect (city-wide)	Yes	The City has a Green Building Resolution, which sets a target of LEED-Silver certification for new construction, replacement facilities and major renovations of city of Houston-owned buildings and facilities with more than 10,000 square feet of occupied space. The City of Houston has 26 LEED Certified projects with 5 projects under review or in the pipeline. In the City's municipal energy efficiency program, 6 million square feet of municipal buildings are achieving guaranteed energy use reductions of 30% with paybacks of, on average, less than ten years. The City used qualified energy conservation bonds (QECBs) to fund the next portion of energy efficiency retrofits for the public libraries. Also, all City buildings are being benchmarked in EPA's Portfolio Manager, over 300 buildings, in hopes to have as many of them achieve an Energy Star rating.

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Buildings	Energy efficiency/ retrofit measures	Institutional (municipal) buildings and facilities: Installation of CFL or other efficient lighting mechanisms	Programme/Project	Currently in effect (city-wide)	Yes	Through performance contracting, a total of 6 million square feet of City facilities are expected to achieve guaranteed energy use reductions of 30%, saving over 22 million kWh of electricity every year, with paybacks of, on average, less than ten years. Both Siemens and Schneider Electric worked on the performance contracting.
Buildings	Energy efficiency/ retrofit measures	Institutional (municipal) buildings and facilities: Insulation	Programme/Project	Currently in effect (city-wide)	Yes	The City has a Green Building Resolution, which sets a target of LEED-Silver certification for new construction, replacement facilities and major renovations of city of Houston-owned buildings and facilities with more than 10,000 square feet of occupied space. The City of Houston has 26 LEED Certified projects with 5 projects under review or in the pipeline. In the City's municipal energy efficiency program, 6 million square feet of municipal buildings are achieving guaranteed energy use reductions of 30% with paybacks of, on average, less than ten years. The City used qualified energy conservation bonds (QECBs) to fund the next portion of energy efficiency retrofits for the public libraries. Also, all City buildings are being benchmarked in EPA's Portfolio Manager, over 300 buildings, in hopes to have as many of them achieve an Energy Star rating.
Buildings	Switching to low-carbon fuels	Institutional (municipal) buildings and facilities: Purchasing 'green' electricity from the grid	Programme/Project	Currently in effect (city-wide)	Yes	The City is a leader in purchasing renewable energy credits. It is the largest purchaser of renewable energy in the U.S. Through the end of December, green power accounted for 50% of the City's electricity usage. In December 2015, the City announced that it would increase the purchase of green power to account for over 75% of its electricity needs. The City's commitment to green power is setting an example for homeowners and businesses in Houston. In November 2015, the City approved to move forward on a 30 MW solar power purchase agreement. Due to the cost of solar energy dropping significantly over the past few years, the City embarked on a process to identify a solar energy provider for its municipal operations to diversify the City's energy portfolio and secure low cost energy and long term price stability. Additional economic benefits to the City include: -Minimize exposure to natural gas price -fluctuations -Realize budget certainty and energy price stability with a guaranteed electricity rate -Long term savings
Community-Scale Development	Brownfield redevelopment programs	Brownfield redevelopment, clean up or rehabilitation initiatives	Programme/Project	Currently in effect (city-wide)	Yes	The Houston Brownfield Program seeks to help redevelop and revitalize properties that are abandoned or underutilized due to real or perceived contamination. Brownfield Properties can include sites such as old gas stations and auto body shops, abandoned industrial facilities, and many more. <a href="http://www.houstontx.gov/brownfields/">http://www.houstontx.gov/brownfields/</a>
Community-Scale Development	Eco-district development strategy	District heating/cooling	Programme/Project	Currently in effect and being piloted	Yes	Houston-based Thermal Energy Corporation (TECO) has provided reliable, cost-effective and energy-efficient cooling and heating to institutions in the Texas Medical Center since 1969. TECO uses district energy and CHP technology to produce chilled water and steam, which we pipe underground to more than 19 million square feet of customer buildings at 18 institutions. With a solid track record of performance, TECO is well-positioned to provide the energy behind what's next for the buildings and pace-setting services and research at the world-renown Texas Medical Center. <a href="http://tecothermalenergy.com/about-teco/">http://tecothermalenergy.com/about-teco/</a>
Community-Scale Development	Green space and/ or biodiversity preservation and expansion	Opening schoolyards for public use	Programme/Project	Currently in effect (city-wide)	Yes	The SPARK School Program works with schools and neighborhoods to develop community parks on public school grounds. In the past 30 years, SPARK has built over 200+ community parks throughout the Houston/Harris County area. Each park is unique, with its design based on ideas and needs of the school and surrounding neighborhoods. While all of the parks are different, a typical park consists of modular playground equipment, a walking trail, benches, picnic tables, trees, an outdoor classroom, and a public art component. <a href="http://www.sparkpark.org/">http://www.sparkpark.org/</a>
Community-Scale Development	Transit oriented development	Integrating low carbon transportation solutions into development (walkability/ bikeability)	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	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. In fiscal year 2015, 87 miles of bike lanes, 52 miles of sidewalks were created, and 40 new or reconstructed transit stops with shelters were created. In 2013, the City passed a Safe Passing ordinance to keep bicyclists and pedestrians safer on city streets. In 2014, the City and BikeHouston joined forces to launch a major bike safety campaign, Goal Zero, to enforce and educate motorists and cyclists about the Safe Passing ordinance, as well as create a Houston Bike Plan for the City. The City helped pass a law, working with CenterPoint, to allow hike and bike trails along utility rights of way. The rights of way provide a clear path of open space in Houston's urban setting, and new trails will help create a complete network of off-street bicycle paths for Houston. In October 2013, the City unveiled Texas' first certified GreenRoads complete streets project in Midtown. In March 2015, the City completed the construction of the first two-way cycle track. The Downtown Park Connector provides connections to Discovery Green and Columbia Tap, as well as Sam Houston Park and Buffalo Bayou. Finally, the City has launched Cigna Sunday Streets HTx. Streets are opened to bicyclists, pedestrians, families, etc. and closed to car traffic. ( <a href="http://www.gohealthyhouston.org/sundaystreetshtx/">http://www.gohealthyhouston.org/sundaystreetshtx/</a> )
Energy Supply	Low or zero carbon energy supply generation	Entering into long-term contracts with renewable energy generators	Programme/Project	Currently in effect and being piloted	Yes	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. The City is the top municipal purchaser of green power. ( <a href="http://www.greenhoustontx.gov/pressrelease20130620.html">http://www.greenhoustontx.gov/pressrelease20130620.html</a> ) In December 2015, the City announced that it would increase the purchase of green power to account for over 75% of its electricity needs. The City's commitment to green power is setting an example for homeowners and businesses in Houston. In November 2015, the City approved to move forward on a 30 MW solar power purchase agreement. Due to the cost of solar energy dropping significantly over the past few years, the City embarked on a process to identify a solar energy provider for its municipal operations to diversify the City's energy portfolio and secure low cost energy and long term price stability. Additional economic benefits to the City include: -Minimize exposure to natural gas price -fluctuations -Realize budget certainty and energy price stability with a guaranteed electricity rate - Long term savings
Energy Supply	Optimize traditional power/ energy production	District heating/cooling	Programme/Project	Currently in effect and being piloted	Yes	Houston-based Thermal Energy Corporation (TECO) has provided reliable, cost-effective and energy-efficient cooling and heating to institutions in the Texas Medical Center since 1969. TECO uses district energy and CHP technology to produce chilled water and steam, which we pipe underground to more than 19 million square feet of customer buildings at 18 institutions. With a solid track record of performance, TECO is well-positioned to provide the energy behind what's next for the buildings and pace-setting services and research at the world-renown Texas Medical Center. <a href="http://tecothermalenergy.com/about-teco/">http://tecothermalenergy.com/about-teco/</a>

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Energy Supply	Smart grid	Smart meters/controls	Programme/Project	Currently in effect (city-wide)	Yes	CenterPoint Energy has completed the installation of more than 2.2 million Itron smart meters. Smart meters are part of CenterPoint Energy's smart grid initiative, designed to give consumers more control over their energy consumption while improving electric reliability and power restoration. <a href="http://www.centerpointenergy.com/services/electricity/competitiveretailers/smartmeters/a3d58d69ef0fe110VgnVCM1000005a1a0d0aRCRD/">http://www.centerpointenergy.com/services/electricity/competitiveretailers/smartmeters/a3d58d69ef0fe110VgnVCM1000005a1a0d0aRCRD/</a>
Food and Agriculture	Encourage sustainable food production and consumption	Municipal food purchasing/procurement guidelines	Programme/Project	Currently in effect and being piloted	Yes	At the City Hall Farmers Market, the public can 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 every Wednesday during the spring and fall season. 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. <a href="http://www.greenhoustontx.gov/farmersmarket.html">http://www.greenhoustontx.gov/farmersmarket.html</a> Go Healthy Houston Go Healthy Houston is improving the health of all Houstonians by increasing access to healthy foods, physical activity, and tobacco-free places. The initiative was launched by Mayor Annise Parker in 2012 and is led by a coalition of public and private partners. <a href="http://www.gohealthyhouston.org/">http://www.gohealthyhouston.org/</a>
Outdoor Lighting	LED / CFL / other luminaire technologies	More efficient luminaires (e.g. LED)	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	In May 2014, it was announced that CenterPoint Energy, in partnership with the City of Houston, will convert approximately 165,000 streetlights from high pressure sodium, mercury vapor and metal halide to light-emitting diode (LED) technology. This replacement project, the largest in the nation, will reduce the City's streetlight energy usage by approximately 50 percent, reduce the City's municipal greenhouse gas emissions (GHG) by five percent and save the City over \$28 million over the life of the project. <a href="http://www.houstontx.gov/mayor/press/20140530.html">http://www.houstontx.gov/mayor/press/20140530.html</a>
Private Transport	Infrastructure for non motorized transport	Cycle hire/share programs	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Houston B-cycle is a "bike sharing" program that works as an additional transportation alternative for people living and visiting Houston. At its core, a public bike sharing system is intended to be used for short trips in and around downtown Houston and surrounding urban areas. There are currently 29 stations and 225 bikes in operation. Since the launch over, there have been over 165,000 checkouts and over 784,000 miles ridden. The Houston Bike Plan will help make Houston a safer, healthier, more bike-friendly city. The Plan will clarify a vision and goals for biking in Houston and identify future projects to create a citywide bicycle network. This improved citywide network will serve a broader spectrum of people who bike at all skill levels, providing more transportation choices, with both on-street and off-street facilities and building on current efforts to create a well-connected citywide bicycle system. The Plan will identify supporting programs like motorist and bicyclist safety education, expansion of end of trip facilities like bike racks and bike share, and improved integration with transit. ( <a href="http://houstontx.gov/bikeplan/">http://houstontx.gov/bikeplan/</a> )
Waste	Recycling or composting collections and/or facilities	Residential organic waste: Municipal recycling points or centers	Programme/Project	Currently in effect (city-wide)	Yes	Residents may dispose of their Tree Waste and Junk Waste at their curbside. Tree Waste is collected during ODD numbered months and Junk Waste is collected during EVEN numbered months. This method of collecting large waste comes with the benefits of diverting materials that can be recycled from landfills, saving landfill space and valuable tax dollars.
Waste	Recycling or composting collections and/or facilities	Residential non-organic waste: Municipal recycling points or centers	Programme/Project	Currently in effect (city-wide)	Yes	In February 2015, Mayor Annise Parker personally delivered 96-gal recycling carts to residents in the Southeast community of Pecan Park, fulfilling the goal of city-wide automated curbside recycling for all residents with City of Houston solid waste collection. Council Member Robert Gallegos and City officials were also on hand to celebrate the final expansion and success of the Automated Recycling Program (ARP). In addition to the Automated Recycling Program, Mayor Parker implemented several other recycling initiatives during her terms in office including opening two new Neighborhood Depository & Recycling Centers, opening the Reuse Warehouse which diverts building material from the landfill, implementing the Business Recycling Program, implementing the Compostable Bag Program, installing Big Belly Solar Compactors and building partnerships with the private sector, such as Living Earth to recycle yard and tree waste, Cherry Companies to recycle concrete, the Houston Furniture Bank to recycle mattresses, CompuCycle to recycle electronics, the Carton Council to recycle shelf-stable & refrigerated cartons and American Textile Recycling Services to recycle textiles, clothes and shoes. <a href="http://houstontx.gov/solidwaste/press/mayor-annise-parker-delivers-promise-goal-met-city-wide-automated-curbside-recycling">http://houstontx.gov/solidwaste/press/mayor-annise-parker-delivers-promise-goal-met-city-wide-automated-curbside-recycling</a>
Water	Water recycling and reclamation	Automatic leak detection	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Consumption Awareness Program To make sure customers get timely and accurate bills, the city measures consumption efficiently through an automated system that transmits water usage data with radio waves, also referred to as an Automated Meter Infrastructure (AMI) network. An attachment on the water meter sends a wireless signal that is picked up by one of the collecting devices located throughout the city, usually on utility poles and in some city buildings like fire stations. Ultimately, the information is transmitted to a central computer where the data can be accessed by account owners, used to generate alerts and used to create water bills. So this information can be utilized by retail customers, the City of Houston has developed a Consumption Awareness Program (CAP) which affords customers with access to their real-time usage information and crosses multiple communication mediums. For more information and examples of the information available in the dashboard or visit <a href="http://www.houstonwater.org">www.houstonwater.org</a> . The City of Houston has completed the implementation of the first phase of the CAP which included: o Converting 75 percent of retail customers to the AMI network o Web-based portal for single-family residential customers to access real-time water usage o Smart phone based application for iPhone and Android users As of the beginning of 2014, approximately 75 percent of retail customer accounts are on the AMI network and 10 percent of single-family retail customers have signed up for the CAP. Mainline Detection Leak program Using the AMI network previously described, the City of Houston is currently in the process of developing a more proactive leak detection program to determine effective next steps for increasing the efficiency of leak detection and repair efforts. Future applications under the network are currently being developed and conceived with manufacturers. These functionalities include pressure sensing, hydrant flow monitoring, water quality sensing, et al. The key to long term viability of this vision is to ensure interoperable end point functionality and open architecture protocols.
Water	Water recycling and reclamation	Education or campaigns to promote water efficiency	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Housed in the administrative building of the Northeast Purification Plant campus, WaterWorks is a learning tool both on the outside and interior. Adjacent to the entry, large metal cisterns collect rainwater runoff for future use and inside, guests are guided through an immersing corridor, where they take on the role of a water molecule—venturing from water source to purification to consumption. The public can learn about Houston's drinking water supply, the science behind it and wise consumption practices at the Water Works Education Center. The center opened in October 2010, just west of Lake Houston, in northeast Harris County.

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Private Transport	Transportation demand management	Restrict parking	Incentive /Disincentive	Currently in effect (city-wide)	Yes	The Downtown Employee Parking/Transit policy (AP: 3-6) has been updated to establish a standard formula for allocating parking spaces in downtown employee parking facilities. An employee working downtown will be eligible for a parking permit or a transit pass. Concurrent use of both is prohibited. This program promotes City employees to use public transportation instead of driving single occupancy vehicles to and from work.

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

**6.2**  
Please provide some additional information on the local government activities you are taking.

Emissions reduction activity	Emissions reduction action	Which exchange most helped to deliver this action?	Anticipated emissions reduction – per annum at action end date (metric tonnes CO2e)	Anticipated emissions reduction – cumulative over the lifetime of the action (metric tonnes CO2e)	Primary (major) financial mechanism	Secondary financial mechanism	Total capital cost (\$USD)	Action start date (mm/yy)	Action end date (mm/yy)
Building performance rating and reporting	Institutional (municipal) buildings and facilities: Audits and advice	Working with cities in a specific C40 Network			Grants / subsidies		10.000.001+	01/04	12/50
Building performance rating and reporting	Institutional (municipal) buildings and facilities: Benchmarking	Working with cities in a specific C40 Network			Grants / subsidies		0 - 100.000	12/11	12/50
Building performance rating and reporting	Institutional (municipal) buildings and facilities: Energy performance certification	Working with cities in a specific C40 Network			Grants / subsidies		10.000.001+	01/04	12/50
Building performance rating and reporting	Institutional (municipal) buildings and facilities: Net metering	Working with cities in a specific C40 Network			Grants / subsidies		2.000.001 - 5.000.000	01/04	12/50
Building performance rating and reporting	Institutional (municipal) buildings and facilities: Smart meters	Working with cities in a specific C40 Network			Grants / subsidies		2.000.001 - 5.000.000	01/04	12/50
Building performance rating and reporting	Institutional (municipal) buildings and facilities: Sub metering	Working with cities in a specific C40 Network			Grants / subsidies		2.000.001 - 5.000.000	01/04	12/50
Energy efficiency/ retrofit measures	Institutional (municipal) buildings and facilities: Building energy management system	Working with cities in a specific C40 Network			Grants / subsidies		250.001 - 500.000	01/04	12/50
Energy efficiency/ retrofit measures	Institutional (municipal) buildings and facilities: Energy performance contracting	Working with cities in a specific C40 Network			Bond issuance (municipal bonds, green bonds, infrastructure bonds)		10.000.001+	01/04	12/50
Building codes and standards	Institutional (municipal) buildings and facilities: Energy performance rating for new construction	Working with cities in a specific C40 Network			City's own funds / savings		10.000.001+	01/04	12/50
Energy efficiency/ retrofit measures	Institutional (municipal) buildings and facilities: Installation of CFL or other efficient lighting mechanisms	Working with cities in a specific C40 Network			Grants / subsidies		1.000.001 - 2.000.000	01/04	12/50
Energy efficiency/ retrofit measures	Institutional (municipal) buildings and facilities: Insulation	Working with cities in a specific C40 Network			Grants / subsidies		1.000.001 - 2.000.000	01/04	12/50
Switching to low-carbon fuels	Institutional (municipal) buildings and facilities: Purchasing 'green' electricity from the grid	Working with cities in a specific C40 Network			City's own funds / savings		2.000.001 - 5.000.000	07/13	06/15
Brownfield redevelopment programs	Brownfield redevelopment, clean up or rehabilitation initiatives	None of the above			Grants / subsidies		2.000.001 - 5.000.000	01/04	12/50
Eco-district development strategy	District heating/cooling	None of the above			Grants / subsidies		2.000.001 - 5.000.000	1/10	12/50
Green space and/ or biodiversity preservation and expansion	Opening schoolyards for public use	None of the above			Grants / subsidies		2.000.001 - 5.000.000		12/50
Transit oriented development	Integrating low carbon transportation solutions into development (walkability/ bikeability)	Working with cities in a specific C40 Network			Tolls / user charges		10.000.001+	10/13	12/50

Emissions reduction activity	Emissions reduction action	Which exchange most helped to deliver this action?	Anticipated emissions reduction – per annum at action end date (metric tonnes CO2e)	Anticipated emissions reduction – cumulative over the lifetime of the action (metric tonnes CO2e)	Primary (major) financial mechanism	Secondary financial mechanism	Total capital cost (\$USD)	Action start date (mm/yy)	Action end date (mm/yy)
Low or zero carbon energy supply generation	Entering into long-term contracts with renewable energy generators	Working with cities in a specific C40 Network			Emissions trading credits		2,000,001 - 5,000,000	07/13	06/15
Optimize traditional power/ energy production	District heating/cooling	None of the above			Grants / subsidies		10,000,001+	1/10	12/50
Smart grid	Smart meters/ controls	None of the above			Developer contributions		10,000,001+	01/83	12/50
Encourage sustainable food production and consumption	Municipal food purchasing/ procurement guidelines	None of the above			Grants / subsidies		250,001 - 500,000	09/12	12/50
LED / CFL / other luminaire technologies	More efficient luminaires (e.g. LED)	Working with non-C40 cities			Developer contributions		10,000,001+	1/15	12/20
Infrastructure for non motorized transport	Cycle hire/ share programs	Working with non-C40 cities			Grants / subsidies		2,000,001 - 5,000,000	05/12	12/50
Recycling or composting collections and/or facilities	Residential organic waste: Municipal recycling points or centers	Working with cities in a specific C40 Network			City's own funds / savings		2,000,001 - 5,000,000	01/04	12/50
Recycling or composting collections and/or facilities	Residential non-organic waste: Municipal recycling points or centers	Working with cities in a specific C40 Network					2,000,001 - 5,000,000	01/04	12/50
Water recycling and reclamation	Automatic leak detection	None of the above			Tolls / user charges		10,000,001+	09/14	12/50
Water recycling and reclamation	Education or campaigns to promote water efficiency	None of the above			Tolls / user charges		1,000,001 - 2,000,000	10/10	12/50
Transportation demand management	Restrict parking	None of the above			Tolls / user charges	City's own funds / savings	1,000,001 - 2,000,000	03/13	12/50

**Page: GHG Emissions Reduction - Community C40**

**7.0**  
Please describe the process by which the city reviews its progress and manages overall responsibility for emissions reduction.

Overall municipal emissions reductions are reported annually. Estimated emissions reduction calculation for individual mitigation projects are made on a case-by-case basis. During the feasibility study of a mitigation project, estimated savings and emissions reduced are calculated. For certain projects, ongoing monitoring of emissions reduced are calculated. This would include building energy efficiency projects.

**7.1**  
Does your city have a climate change action plan for reducing GHG emissions?

No

**7.1b**  
Please describe any future plans to create a city climate change action plan.

The City has completed the STAR Communities Rating assessment and has achieved a 3-STAR rating. Using this as a baseline assessment of community-wide sustainability, the findings have helped demonstrate where the strengths and gaps are in the community and will help inform a future city climate change action plan. The Mayor's Office of Sustainability is working on updating a sustainability plan for municipal operations. Currently, the Planning Department is working on a general plan for the city that will include sustainability strategies.

**7.2**  
Do you have a GHG emissions reduction target in place for your community?

No

**7.2b**  
Please explain why you do not have a city-wide emissions reduction target.

The City of Houston does not have a community-wide climate action plan.

**7.3.**  
What actions are you undertaking to reduce emissions city-wide?

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Buildings	Building performance rating and reporting	Commercial buildings and facilities: Audits and advice	Policy	Still under consideration or awaiting final authorisation	Yes	The City is considering energy energy efficiency programs and policies for commercial buildings.
Buildings	Building performance rating and reporting	Commercial buildings and facilities: Benchmarking	Policy	Still under consideration or awaiting final authorisation	Yes	The City of Houston has voluntary benchmarking programs, like the Houston Green Office Challenge and the DOE's Better Buildings Challenge, where commercial buildings can opt into disclosing their energy ratings to the City. The City is considering an energy benchmarking, audit, and disclosure policy for commercial buildings.
Buildings	Building performance rating and reporting	Commercial buildings and facilities: Energy performance certification	Policy	Still under consideration or awaiting final authorisation	Yes	The City is considering energy energy efficiency programs and policies for commercial buildings.
Buildings	Building performance rating and reporting	Commercial buildings and facilities: Smart meters	Programme/Project	Currently in effect (city-wide)	Yes	Over 2.2 million smart meters have been installed across Houston, allowing consumers to see their yearly, monthly or daily electricity use down to 15-minute increments at SmartMeterTexas.com, get near-real time usage or bill forecasts on an In-Home Display energy monitor, and benefit from new retail electric products and services such as pre-paid service, time-of-use rates, and energy analysis tools.
Buildings	Building performance rating and reporting	Residential - Private housing: Audits and advice	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	The Residential Energy Efficiency Program (REEP) provides income-qualified Houstonians the opportunity to receive weatherization measures in their homes at no charge. The efficiency upgrades were based on a custom assessment of each home that determined the measures needed to make the home more energy efficient. The City has helped 13,000 Houstonians to date, spending \$30 million (DOE grant funded). The City is now working with CenterPoint Energy to continue this successful program, with over \$5 million committed through 2014.
Buildings	Building performance rating and reporting	Residential - Private housing: Benchmarking	Policy	Currently in effect (city-wide)	Yes	The Residential Energy Efficiency Program (REEP) provides income-qualified Houstonians the opportunity to receive weatherization measures in their homes at no charge. The City has helped 13,000 Houstonians to date, spending \$30 million (DOE grant funded). The City is now working with CenterPoint Energy to continue this successful program, with over \$5 million committed through 2014.
Buildings	Building performance rating and reporting	Residential - Private housing: Energy performance certification	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	The Residential Energy Efficiency Program (REEP) provides income-qualified Houstonians the opportunity to receive weatherization measures in their homes at no charge. The City has helped 13,000 Houstonians to date, spending \$30 million (DOE grant funded). The City is now working with CenterPoint Energy to continue this successful program, with over \$5 million committed through 2014.
Buildings	Building performance rating and reporting	Residential - Private housing: Net metering	Programme/Project	Currently in effect and being piloted	Yes	Some retail electric providers, like Green Mountain Energy, offer credits to customers for any excess energy that their qualifying distributed renewable generation facility exports to the electricity grid.
Buildings	Building performance rating and reporting	Residential - Private housing: Smart meters	Policy	Currently in effect (city-wide)	Yes	Over 2.2 million smart meters have been installed across Houston, allowing consumers to see their yearly, monthly or daily electricity use down to 15-minute increments at SmartMeterTexas.com, get near-real time usage or bill forecasts on an In-Home Display energy monitor, and benefit from new retail electric products and services such as pre-paid service, time-of-use rates, and energy analysis tools.
Buildings	Energy efficiency/ retrofit measures	Commercial buildings and facilities: Building energy management system	Policy	Currently in effect at a significant scale across most of the city	Yes	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.
Buildings	Energy efficiency/ retrofit measures	Commercial buildings and facilities: CFL or other efficient lighting mechanisms	Policy	Currently in effect (city-wide)	Yes	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.
Buildings	Energy efficiency/ retrofit measures	Commercial buildings and facilities: Daylighting	Policy	Currently in effect (city-wide)	Yes	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.
Buildings	Energy efficiency/ retrofit measures	Commercial buildings and facilities: Energy performance contracting	Incentive /Disincentive	Not currently being considered	No	In 2012, the City launched the Energy Efficiency Incentive Program (EEIP) provided a financial incentive to help office building owners, property managers and tenants located in the City of Houston to reduce energy consumption and increase the economic performance of their building. Funding is no longer available in this program. The Houston Green Office Challenge provided education on energy performance contracting and helping building owners/property managers find resources to help fund energy efficiency retrofits.

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Buildings	Energy efficiency/ retrofit measures	Commercial buildings and facilities: Heating and cooling efficiency	Policy	Currently in effect (city-wide)	Yes	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.
Buildings	Energy efficiency/ retrofit measures	Commercial buildings and facilities: Insulation	Policy	Currently in effect (city-wide)	Yes	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.
Buildings	Energy efficiency/ retrofit measures	Residential - Private housing: HVAC operations & maintenance	Policy	Currently in effect (city-wide)	Yes	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. Beginning February 1, 2014, the City of Houston Energy Code for residential structures requires that new buildings achieve 15% efficiency above the currently adopted Houston Energy Code (i.e. 15% above IECC 2009). The City has the authority to set residential building energy codes that meet or are more stringent than the statewide code.
Buildings	Energy efficiency/ retrofit measures	Residential - Private housing: Installation of efficient lighting systems	Policy	Currently in effect (city-wide)	Yes	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. Beginning February 1, 2014, the City of Houston Energy Code for residential structures requires that new buildings achieve 15% efficiency above the currently adopted Houston Energy Code (i.e. 15% above IECC 2009). The City has the authority to set residential building energy codes that meet or are more stringent than the statewide code.
Buildings	Energy efficiency/ retrofit measures	Residential - Private housing: Insulation	Policy	Currently in effect (city-wide)	Yes	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. Beginning February 1, 2014, the City of Houston Energy Code for residential structures requires that new buildings achieve 15% efficiency above the currently adopted Houston Energy Code (i.e. 15% above IECC 2009). The City has the authority to set residential building energy codes that meet or are more stringent than the statewide code. Houston is the first city in Texas to be 10% above IECC 2009. Per an ordinance adopted in 2011, City Council will vote again at the end of 2013 to adopt 15% above IECC 2009, putting Houston in compliance with IECC 2012. The City has the authority to set residential building energy codes that meet or are more stringent than the statewide code.
Buildings	On-site renewable energy generation	Residential - Private housing: Combined heat and power	Programme/Project	Currently in effect and being piloted	Yes	HOUZE® Advanced Building Science Inc., along with the City of Houston, debuted the first-of-its-kind zero-energy homes in the United States, in the community of Independence Heights, just north of downtown Houston. These homes introduce a new, affordable option for buyers by producing more energy than they consume, redefining the American Dream with homes that cost less to own, operate and maintain. HOUZE® (the "ZE" stands for Zero Energy) Advanced Building Science Inc. is an innovative, technology commercialization company integrating disruptive technologies into real estate development and building. The company's mission is to empower the building industry with next generation building systems, materials and technologies to create affordable net-zero energy homes and buildings. It is 100% powered by natural gas and power cell. <a href="http://thezeroenergyhome.com/">http://thezeroenergyhome.com/</a>
Buildings	On-site renewable energy generation	Residential - Private housing: Solar electricity	Policy	Currently in effect (city-wide)	Yes	The City of Houston encourages the installation of green technologies by residents and business owners. In November 2015, the Houston Permitting Center announced that it will prioritize the review of solar-only plans. Once at 20 days, the review of solar-panel plans for existing residential and commercial buildings will be reduced to 7 days. <a href="https://edocs.publicworks.houstontx.gov/documents/divisions/planning/enforcement/1198_residential_solarpanel_permits_and_inspection_guide.pdf">https://edocs.publicworks.houstontx.gov/documents/divisions/planning/enforcement/1198_residential_solarpanel_permits_and_inspection_guide.pdf</a> The City's 5-Star Program is a creative way to couple renewable energy systems and energy efficient 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. On the regulatory side, funded by the DOE's SunShot Rooftop Solar Challenge grant, the City worked with the Houston Advanced Research Center on streamlining and refining the solar permitting process. NRG Energy has a Residential Solar Solutions-Solar Leasing program: <a href="http://www.nrgsolar.com/#welcome">http://www.nrgsolar.com/#welcome</a>
Buildings	Switching to low-carbon fuels	Residential - Private housing: Purchasing of 'green' electricity from the grid	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Retail electric providers that offer green power include: Reliant (NRG), Green Mountain (NRG), TXU, Gexa, and Stream.
Community-Scale Development	Brownfield redevelopment programs	Brownfield redevelopment, clean up or rehabilitation initiatives	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	The Houston Brownfield Program seeks to help redevelop and revitalize properties that are abandoned or underutilized due to real or perceived contamination. Brownfield Properties can include sites such as old gas stations and auto body shops, abandoned industrial facilities, and many more. Our program offers comprehensive services to help with these problem properties. <a href="http://www.houstontx.gov/brownfields/">http://www.houstontx.gov/brownfields/</a>
Community-Scale Development	Building standards	Green community rating system LEED-ND, GreenStar, Enterprise Communities, etc.	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	In 2015, the City received national recognition for its sustainability leadership from STAR Communities. The City of Houston was awarded a Certified 3-STAR Community Rating and is the third community from Texas to achieve certification under the national STAR Community Rating System (STAR), joining Austin and Plano as Certified STAR Communities. Houston is currently the largest city in the nation to become certified in the program. One of the goals for the Houston Green Office Challenge was to help participants achieve Energy Star or LEED certifications for their buildings. The City had 400 participants in this voluntary program. Houston is #5 in the nation for the number of LEED certified buildings and was ranked #8 in Energy STAR buildings in 2015.

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Community-Scale Development			Incentive /Disincentive	Currently in effect (city-wide)	Yes	Indirect financial incentives are in place which work to promote desired density, and related built forms, in and around Light Rail Transit (LRT) Stations by allowing reduced parking and setbacks. Where feasible, financial incentives are provided on a case-by-case basis as administered through the Economic Development division of the City of Houston's Major's Office. The City of Houston passed Ordinance No. 2012-739, which established an economic development program called the Downtown Living Initiative Chapter 380 Program. The purpose of the Downtown Living Initiative Chapter 380 Program (Program) is to promote economic development and stimulate business and commercial activity in the target area by providing economic and other development incentives for certain new multifamily residential mixed-use developments. The target area comprising the east side of downtown offers exciting attractions and amenities including Discovery Green Park, Phoenicia Market, churches and schools (including the planned HISD High School for the Performing and Visual Arts), major hotels, three of the region's four major sports venues and the George R. Brown Convention Center, ranked in the nation's top twenty.
Community-Scale Development	Compact cities	Minimum density requirements	Policy	Currently in effect (city-wide)	Yes	Under Chapter 42 (Subdivisions, Developments and Platting Ordinance) • General development structure allows for mixed land use development. The "unrestricted reserve" designations allows parcels to be platted without any restriction to the land use. • Created optional performance standards that allow transit oriented developments to receive reduced building setbacks along the existing and proposed Metro Rail/BRT corridors. • Propose to remove the "urban area" and "suburban area" designations as defined by boundary created by Loop 610. Create a core set of rules that apply to the City and the Extra Territorial Jurisdiction (ETJ). Establish optional, city-wide performance standards for single-family residential developments and reduced building lines for commercial, retail, and multi-family developments along major thoroughfares with a planned right-of-way of 80-feet or less. • Propose to establish a minimum lot size of 3,500 SF in the city. The minimum lot size of the ETJ will remain 5,000 SF. • Propose to allow lot size averaging within the city. Lots may be less than 1,400 SF if the average lot area in the subdivision or block face is a minimum of 1,400 SF. • Propose to allow lot width averaging within the city. Lots may have an average lot width of 18-feet within a subdivision or block face as long as no lots are less than 15-feet in width. • Propose to require lots immediately adjacent to the public street and opting into a reduced building setback performance standard to have a front door and pedestrian access to the public street.
Community-Scale Development	Compact cities	Strategic refurbishment/ re-use of unused buildings for new purposes	Policy	Currently in effect (city-wide)	Yes	Since its inception in the early 1830s, Houston has encountered many transformations. The development of Houston from a tiny village to a substantial metropolitan city is recognized and interpreted through its remaining historic structures. In 1995, City Council adopted Houston's Historic Preservation Ordinance in effort to help preserve the significant reminders of the city's collective past as represented through the built environment. Through this ordinance, the City of Houston offers a process and methods to maintain Houston's architectural history. Landmark and Protected Landmark designations allow for both recognition and protection of individual historic structures, while Historic District designations encourage the recognition and protection of neighborhoods with distinct historic character by classifying a specific bounded area historically significant.
Community-Scale Development	Eco-district development strategy	District heating/cooling	Programme/Project	Currently in effect and being piloted	Yes	There are 16 district energy systems in the city. Downtown Houston houses the Union Station District Energy Center, which has an underground piping network in downtown, totaling about 4 miles in length. The piping grid connects the district energy center with other customers, including Minute Park and the Alley Theatre. This system serves 24 buildings, which is approximately 6.5 million SF in downtown Houston. Overall, Entergy Solutions District Cooling provides service to approximately 7.2 million SF of space with an efficiency of 0.88 kwh/ton-hour. Also, the Thermal Energy Corporation (TECO) has the largest district cooling system in the country and owns and operates a CHP-based district energy system in the Texas Medical Center.
Community-Scale Development	Green space and/ or biodiversity preservation and expansion	Conservation or restoration of ecological corridors/connectivity	Policy	Currently in effect (city-wide)	Yes	The Tree Protection Ordinance as contained in sections V and VI of Chapter 33 of the City of Houston Code of Ordinances pertains to the protection and preservation of trees and shrubs on city property. Under this ordinance, City Council has been given the power to designate a green corridor to consist of right-of-ways of a major thoroughfare and building setback areas of abutting and adjacent properties in order to enhance the beauty of our city. Within the corridor, existing trees are given enhanced protection and the varieties of acceptable new trees are listed. The ordinance requires any tree removal in the corridor to be authorized by city permit, and the tree must be replaced by a specifically stated formula. This applies to trees affected by new construction or renovation of existing structures or parking lots.
Community-Scale Development	Green space and/ or biodiversity preservation and expansion	Conservation or restoration of natural/semi-natural areas	Policy	Currently in effect (city-wide)	Yes	The Tree Protection Ordinance as contained in sections V and VI of Chapter 33 of the City of Houston Code of Ordinances pertains to the protection and preservation of trees and shrubs on city property. This includes trees on right-of-ways, medians, parks and other city property. A permit is required to remove any tree on city property or on a setback.
Community-Scale Development	Green space and/ or biodiversity preservation and expansion	Home gardens/garden plots	Policy	Currently in effect (city-wide)	Yes	Many citizens are interested in creating Natural Areas as part of their home landscaping to reduce maintenance, attract wildlife, and create garden diversity. However, going the natural area route within the city does not mean simply allowing an area to go unmanaged. The City of Houston Ordinance 32-10 defines a "natural area" as an area of native vegetation within planned and managed landscape. The ordinance gives the Houston Parks and Recreation Department, under the authority of the Director of the Department, the authority to create Rules and Regulations for Natural Areas. Permitting authority for Natural Areas is also given to the department by city ordinance. In addition, the ordinance stipulates what is considered native vegetation and the parameters for use of such plants in the creation, preservation, or restoration of natural plant communities. <a href="http://www.houstontx.gov/parks/naturalareaspermit.html">http://www.houstontx.gov/parks/naturalareaspermit.html</a>
Community-Scale Development	Green space and/ or biodiversity preservation and expansion	Opening schoolyards for public use	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	The SPARK School Park Program is a non-profit organization operating out of the City of Houston Mayor's office. Developed in 1983 as a way to increase park space in Houston, Texas, Former City Council Member, Eleanor Tinsley, created SPARK to develop public school grounds into neighborhood parks. An inter-local agreement, one of the first in Houston, between the city, the Houston Parks Board and the school district, formally established the SPARK program. SPARK combines the resources of the Department of Housing and Community Development, seven local school districts, Harris County, the private sector, neighborhood group, PTA/PTO groups and concerned citizens. <a href="http://www.sparkpark.org/">http://www.sparkpark.org/</a>

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Community-Scale Development	Green space and/ or biodiversity preservation and expansion	Protection of large green and open spaces within the City	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	In November, 2012, city voters passed a bond referendum for the Bayou Greenways Initiative. Over the next ten 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: • Reduced doctor visits due to increased access to recreation opportunities; • Increase in use of alternative transportation for commuting along the hike and bike trails; • Increase in property values along the corridor resulting in increased revenue to the city; • Increased flood prevention due to the opportunity for wet-bottom detention areas in the newly created green spaces; • Increased water quality due to the simple plantings located strategically along the bayous, the wet-bottom detention ponds, and reduced runoff; • Increased air quality due to increased CO2 sequestration by newly planted trees and grasses, and use of trails for alternative transportation; and • Change in Houston's image to attract the best and brightest to our city.
Community-Scale Development	Green space and/ or biodiversity preservation and expansion	Reforestation	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Memorial Park Conservancy (MPC) and the Houston Parks and Recreation Department (HPARD) have started planting new trees in Memorial Park, which suffered massive tree loss after a severe drought in 2011. The Memorial Park Forestry Conservation & Management Plan will work on replanting thousands of trees.
Community-Scale Development	Green space and/ or biodiversity preservation and expansion	Stewardship of open spaces	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	In November, 2012, city voters passed a bond referendum for the Bayou Greenways Initiative. Over the next ten 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: • Reduced doctor visits due to increased access to recreation opportunities; • Increase in use of alternative transportation for commuting along the hike and bike trails; • Increase in property values along the corridor resulting in increased revenue to the city; • Increased flood prevention due to the opportunity for wet-bottom detention areas in the newly created green spaces; • Increased water quality due to the simple plantings located strategically along the bayous, the wet-bottom detention ponds, and reduced runoff; • Increased air quality due to increased CO2 sequestration by newly planted trees and grasses, and use of trails for alternative transportation; and • Change in Houston's image to attract the best and brightest to our city.
Community-Scale Development	Green space and/ or biodiversity preservation and expansion	Tree planting/Afforestation	Programme/Project	Currently in effect (city-wide)	Yes	The Million Trees + Houston program is adding to the city's Urban Forest by planting more than a million new trees in a three to five year period. The program is coordinated by the Houston Parks and Recreation Department in partnership with Trees for Houston. Other partners include Harris County, the Texas Department of Transportation, and the Quality of Life Coalition. In the interest of creating a greener, more livable city, many private corporations are joining the effort through a special "Gift of Trees" program. <a href="http://www.houstontx.gov/parks/forestry/milliontrees.html">http://www.houstontx.gov/parks/forestry/milliontrees.html</a>
Community-Scale Development	Transit oriented development	Expanding transit to connect existing development	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	In addition to the existing 7.5-mile Main Street line, METRO opened the North Line open in December, 2013, and the East End and Southeast Lines opened in May 2015. The North Line extends the existing Red Line by 5.3 miles and runs through the heart of the historic Northside, a neighborhood rooted in rail that came into being with the expansion of the Hardy Rail Lines in the 1880s. The 3.3 mile East End Line (Green Line) travels along Harrisburg from the Magnolia Park Transit Center through the historic East End to a variety of downtown entertainment and business destinations. The Southeast Line (Purple Line) begins downtown and travels southeast along Capitol and Rusk to the Palm Center near MLK and Griggs. The 6.6 mile line travels through one of Houston's oldest African-American communities and connects to Texas Southern University and University of Houston.
Community-Scale Development	Transit oriented development	Prioritising development in areas well connected by transit	Incentive /Disincentive	Currently in effect at a significant scale across most of the city	Yes	Indirect financial incentives are in place which work to promote desired density, and related built forms, in and around Light Rail Transit (LRT) Stations by allowing reduced parking and setbacks. Where feasible, financial incentives are provided on a case-by-case basis as administered through the Economic Development division of the City of Houston's Mayor's Office.
Community-Scale Development	Transit oriented development	Restricting parking spaces in new development	Policy	Currently in effect (city-wide)	Yes	In the City of Houston Ordinance No. 2013-208 regarding parking requirements, if a development adds bicycle spaces, is a transit-oriented development, or a historic building, it can reduce its parking space requirement. Under Chapter 26 (The Off-Street Parking Ordinance) • Require bicycle parking for new commercial, retail, and office. Provide incentives that allow for reduced automobile parking up to 10% if additional bicycle parking is provided. • Expand options within the Shared Parking table to allow more uses to participate in shared parking and expand the time periods, thereby reducing the overall number of parking spaces. Director is given discretion to waive up to 10% of the total number of spaces based upon detailed parking study. • Establish procedures and criteria to allow areas to create different parking standards, such as reduced parking requirements, expanded distance for off-site parking, or even the removal of parking requirements. These areas are called Special Parking Areas and are the next generation of Parking Management Areas. • Per requests from the community, the "Warehouse District" on the north side of Downtown has now been included in the Central Business District (CBD) – a district exempt from off-street parking requirements. • Allow a 40% reduction in the parking requirements for a protected landmarked or contributing structure within a historic district that receives an approved Certificate of Appropriateness • Allow grandfathered uses to redevelop into a less intense use without providing additional parking provided, however, they maintain existing parking spaces. • Allow a 20% reduction in the parking requirements for transit-orientated developments that opt-in to the pedestrian/transit focused performance standards found in Chapter 42. <a href="http://www.houstontx.gov/planning/DevelopRegs/offstreet/docs_pdfs/Chapter26_Ordinance_march_2013.pdf">http://www.houstontx.gov/planning/DevelopRegs/offstreet/docs_pdfs/Chapter26_Ordinance_march_2013.pdf</a>
Community-Scale Development	Transit oriented development	Using current transportation infrastructure projects as focus for new neighbourhood development	Incentive /Disincentive	Currently in effect at a significant scale across most of the city	Yes	Indirect financial incentives are in place which work to promote desired density, and related built forms, in and around Light Rail Transit (LRT) Stations by allowing reduced parking and setbacks. Where feasible, financial incentives are provided on a case-by-case basis as administered through the Economic Development division of the City of Houston's Mayor's Office.

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Community-Scale Development	Urban agriculture	Rooftop and vertical farming	Programme/Project	Currently in effect and being piloted	Yes	The City has demonstration green roof using native plants at the Houston Permitting Center.
Energy Supply	Low or zero carbon energy supply generation	Advanced thermal treatment of biomass	Programme/Project	Still under consideration or awaiting final authorisation	Yes	One Bin for All is a revolutionary idea for 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. 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: • Provide every residence with curbside One Bin for All services; • Decrease the volume of waste sent to landfills; • Reduce air pollution; and, • Manage waste and recycling costs. Allowing technology and new process systems to sort household materials and derive an initial 55% diversion rate, and upwards of 75% with composting, anaerobic digestion and catalytic conversion (biomass-to-fuel) is more efficient and effective. Proven technologies (shredders, sensors, density separators and optical scanners) have been used previously in the waste, mining, or refining industries, but combined in a new process will yield a much higher recycling rate. This innovation will reduce greenhouse gas (GHG) emissions and improve air quality, provide an easy-to-use program for residents, save money and increase revenues.
Energy Supply	Low or zero carbon energy supply generation	Anaerobic digestion	Programme/Project	Still under consideration or awaiting final authorisation	Yes	One Bin for All is a revolutionary idea for 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. 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: • Provide every residence with curbside One Bin for All services; • Decrease the volume of waste sent to landfills; • Reduce air pollution; and, • Manage waste and recycling costs. Allowing technology and new process systems to sort household materials and derive an initial 55% diversion rate, and upwards of 75% with composting, anaerobic digestion and catalytic conversion (biomass-to-fuel) is more efficient and effective. Proven technologies (shredders, sensors, density separators and optical scanners) have been used previously in the waste, mining, or refining industries, but combined in a new process will yield a much higher recycling rate. This innovation will reduce greenhouse gas (GHG) emissions and improve air quality, provide an easy-to-use program for residents, save money and increase revenues.
Energy Supply	Low or zero carbon energy supply generation	Property tax rebate	Incentive /Disincentive	Currently in effect (city-wide)	Yes	In September 2009, Houston enacted Ordinance No. 2009-858, the City of Houston Tax Abatement Program, which establishes a partial tax abatement for commercial buildings that meet LEED standards. In order to qualify for the abatement, applicants must register with the US Green Building Council and then submit an application for the abatement prior to beginning any construction on the project. The tax abatement benefit will not become affective until construction of the project has completed and LEED certification is obtained. In addition, projects must meet a minimum investment level for the incremental cost of obtaining the LEED certification.
Energy Supply	Low or zero carbon energy supply generation	Solar electricity (photovoltaic, concentrating solar)	Programme/Project	Currently in effect and being piloted	Yes	The City has existing installations at the George R. Brown Convention Center, City Hall Annex, Discovery Green, and most recently, the Houston Permitting Center. The Green Building Resource Center housed within the Houston Permitting Center provides education and shows real-time energy production of its rooftop solar panels. 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. On the regulatory side, funded by the DOE's SunShot Rooftop Solar Challenge grant, the City worked with HARC on streamlining and refining the solar permitting process. With the support of some federal grant funding, the City will be working on promoting market readiness of solar technologies. Grant funding will be used to make installing rooftop solar photovoltaic easier, faster, and cheaper for homeowners and businesses by implementing streamlined and standardized processes that will dramatically improve local market conditions. The City is also now working on a PACE (Property Assessed Clean Energy) commercial district for Houston, which will create financing that can help property owners break down the financial barriers to installing renewable energy projects. Using grant funding, 17 mobile solar-powered shipping containers/generators (SPACE units) were acquired through a partnership with the University of Houston Green Building Components Program and placed at fire stations, parks, neighborhood centers and schools. The generators are designed for emergency relief efforts or cooling centers during times of extreme heat. When not being used in an emergency, they are used year-round for services, outdoor classrooms or to educate the public and bring awareness to solar projects. The City is also working on a program to build 30 MW of solar power to add to the City's renewable energy mix.
Energy Supply	Optimize traditional power/ energy production	Heat generation asset replacement	Programme/Project	Currently in effect (city-wide)	Yes	Many buildings have replaced boilers.
Energy Supply	Optimize traditional power/ energy production	Increased capture of waste heat	Programme/Project	Currently in effect (city-wide)	Yes	Houston-based Thermal Energy Corporation (TECO) has provided reliable, cost-effective and energy-efficient heating and cooling to institutions in the Texas Medical Center since 1969. TECO uses district energy and CHP technology to produce chilled water and steam, which we pipe underground to more than 18 million square feet of customer buildings at 18 institutions. With a solid track record of performance, TECO is well-positioned to provide the energy behind what's next for the buildings and pace-setting services and research at the world-renown Texas Medical Center. The Houston airport systems utilizes waste heat recovery as well.
Energy Supply	Smart grid	Development of smart grids	Programme/Project	Currently in effect (city-wide)	Yes	CenterPoint Energy Houston Electric's (CPE) Smart Grid project involves deployment of a fully integrated advanced metering system and Web portal access to over 2.2 million customers, along with installation of advanced monitoring and distribution automation equipment. The project aims to reduce peak loads, overall electricity use, and operations and maintenance costs while increasing distribution system reliability. The project implements secure communications to: (1) allow smart meter customers to view their electricity consumption data whenever they want through the Smart Meter Texas (SMT) data exchange, and (2) allow CPE to effectively visualize and operate the distribution system. As a transmission and distribution service provider, CPE provides metering data to retail energy providers (REPs) through the SMT data exchange. The billing data and customer systems enable REPs to offer information feedback, new pricing programs, and other electric service options to customers. The project also deploys a more advanced distribution management system and automated feeder switching, that reduces operational costs and improves service reliability.

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Energy Supply	Smart grid	Smart meters/ controls	Programme/Project	Currently in effect (city-wide)	Yes	CenterPoint Energy Houston Electric's (CPE) Smart Grid project involves deployment of a fully integrated advanced metering system and Web portal access to over 2.2 million customers, along with installation of advanced monitoring and distribution automation equipment. The project aims to reduce peak loads, overall electricity use, and operations and maintenance costs while increasing distribution system reliability. The project implements secure communications to: (1) allow smart meter customers to view their electricity consumption data whenever they want through the Smart Meter Texas (SMT) data exchange, and (2) allow CPE to effectively visualize and operate the distribution system. As a transmission and distribution service provider, CPE provides metering data to retail energy providers (REPs) through the SMT data exchange. The billing data and customer systems enable REPs to offer information feedback, new pricing programs, and other electric service options to customers. The project also deploys a more advanced distribution management system and automated feeder switching, that reduces operational costs and improves service reliability.
Energy Supply	Smart grid	Smart street lighting	Procurement	Currently in effect (city-wide)	Yes	All streetlights are retrofitted with photocell technology in order to deliver lighting based on need instead of being set on a timer.
Food and Agriculture	Encourage sustainable food production and consumption	Community gardens or allotments	Programme/Project	Currently in effect and being piloted	Yes	The City has a community garden program to show citizens how to grow nutritious foods and give the community a chance to participate in the process. There are 11 gardens at locations all across Houston. 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: • Encourage urban agriculture in neighborhoods, utilizing vacant City property • Improve access to healthy, affordable and locally produced food for all neighborhoods • Support education regarding the benefits of sustainable agriculture 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; and 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.
Food and Agriculture	Encourage sustainable food production and consumption	Rooftop farming	Programme/Project	Still under consideration or awaiting final authorisation	Yes	The City is considering having a demonstration rooftop garden.
Mass Transit	Improve bus infrastructure, services, and operations	Bus priority at traffic lights	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	The new 402 Quickline Bellaire operates with the efficiency of METRORail by offering limited stops to popular business centers all along the line. The new Quickline features eight state-of-the-art bus stations complete with digital "next bus" signage to inform riders when the bus will arrive. In addition, a bright blue road stripe has been painted along the entire route for easy identification. The Quickline bus also has priority at traffic lights.
Mass Transit	Improve bus infrastructure, services, and operations	Bus rapid transit	Programme/Project	Currently in effect and being piloted	Yes	METRO launched the System Re-imagining project in 2013. This 12 month project involved "re-imagining" the METROBus system from the ground up, using a completely blank slate approach. This consultant-led study, involving significant community outreach and involvement, looked to define goals and objectives for the transit system, what kind of transit services should METRO be providing, and then develop a fiscally-constrained 5-Year Transit Service Plan with both capital and operating components. The newly designed bus system launched in August 2015. An important component of METRO's regional mobility plan, Signature Service is based on the successful Bus Rapid Transit model. The result: METRO's 402 Quickline Bellaire route provides faster travel and fewer stops aboard high-end hybrid vehicles, plus greater reliability and increased customer convenience through the use of integrated technology, infrastructure and operational investments. <a href="http://www.ridemetro.org/Services/Bus/Quickline_SignatureService.aspx">http://www.ridemetro.org/Services/Bus/Quickline_SignatureService.aspx</a> Uptown/Galleria is considering a bus rapid transit system to service the district.
Mass Transit	Improve bus infrastructure, services, and operations	Increase routes, frequency and night services	Programme/Project	Currently in effect (city-wide)	Yes	METRO launched the System Re-imagining project in 2013. This 12 month project involved "re-imagining" the METROBus system from the ground up, using a completely blank slate approach. This consultant-led study, involving significant community outreach and involvement, looked to define goals and objectives for the transit system, what kind of transit services should METRO be providing, and then develop a fiscally-constrained 5-Year Transit Service Plan with both capital and operating components. The newly designed bus system launched in August 2015.
Mass Transit	Improve bus infrastructure, services, and operations	Increase the number of bus stops	Programme/Project	Currently in effect (city-wide)	Yes	METRO launched the System Re-imagining project in 2013. This 12 month project involved "re-imagining" the METRO Bus system from the ground up, using a completely blank slate approach. This consultant-led study, involving significant community outreach and involvement, looked to define goals and objectives for the transit system, what kind of transit services should METRO be providing, and then develop a fiscally-constrained 5-Year Transit Service Plan with both capital and operating components. The newly designed bus system launched in August 2015.
Mass Transit	Improve bus infrastructure, services, and operations	Priority lanes	Programme/Project	Currently in effect (city-wide)	Yes	Priority lanes for buses include the HOV lane, HOT Lanes, and diamond lanes downtown that give priority to buses during peak hours. <a href="http://www.ridemetro.org/Services/HOTLanes.aspx">http://www.ridemetro.org/Services/HOTLanes.aspx</a>
Mass Transit	Improve bus infrastructure, services, and operations	Provide more bus shelters	Programme/Project	Currently in effect (city-wide)	Yes	The Passenger Bus Shelter Program is an initiative to install bus shelters throughout the METRO service area. The program consists of the design and construction of new shelter foundations, as well as the fabrication and installation of standard passenger bus shelters. This program reinforces METRO's commitment to reinvesting in the agency's bus system backbone. Public response has been very positive. Installation of shelters has been shown to increase ridership at a given bus stop by an average of 20 additional riders per day. Bus shelters provide patrons both safety and protection from the elements. The Board is funding 100 new bus shelters per year. <a href="http://www.ridemetro.org/CurrentProjects/BusShelterProgram.aspx">http://www.ridemetro.org/CurrentProjects/BusShelterProgram.aspx</a>

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Mass Transit	Improve bus infrastructure, services, and operations	Upgrade buses to increase accessibility	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Shaded paths to bus stops are available at numerous bus stops across the city. Also, in the Houston-Galveston Area Council Livable Centers studies, there are recommendations for improved sidewalk connectivity and more street trees, which will increase accessibility of bus services. <a href="http://videos.h-gac.com/CE/livablecenters/Downtown-EaDo_Livable_Centers_Study.pdf">http://videos.h-gac.com/CE/livablecenters/Downtown-EaDo_Livable_Centers_Study.pdf</a>
Mass Transit	Improve fuel economy and reduce CO2 from bus and/or light rail	Improve rail, metro and tram fuel economy and reduce CO2	Procurement	Still under consideration or awaiting final authorisation	Yes	The new North, East End and Southeast lines dramatically increase light rail's reach across Houston. To handle the increased capacity, METRO is quadrupling the number of light-rail vehicles in their fleet. Now three different types of vehicles – the H1, which has been operating since 2004; the H2, which is now in service; and the H3 – will carry passengers all around Houston.
Mass Transit	Improve fuel economy and reduce CO2 from bus and/or light rail	Promote fuel-efficient bus driving and reduce idling	Policy	Currently in effect (city-wide)	Yes	All METRO buses are programmed to automatically shut down after 20 minutes of idling.
Mass Transit	Improve fuel economy and reduce CO2 from bus and/or light rail	Switch buses to Compressed Natural Gas	Programme/Project	Currently in effect (city-wide)	Yes	Free and convenient transportation has returned to downtown with Greenlink. Through a partnership between the Downtown District, BG Group and Houston First Corporation, the downtown community can utilize the environmentally-friendly buses to get to popular downtown locations quickly. The buses run on Compressed Natural Gas (CNG), making them a cleaner transportation alternative. Greenlink is operated by METRO through an interlocal agreement with the Downtown District. This is a pilot program utilizing a CNG bus, and METRO is looking to expand its fleet with more CNG buses. In March 2015, with the delivery of fifty 40-foot New Flyer Xcelsior CNG buses scheduled for the spring and an additional 150 to be delivered in 2016, METRO, the transit agency serving the city of Houston and most of surrounding Harris County, executed an agreement that will have Freedom Fuel PBP (Freedom CNG) supply CNG to fuel the transit agency's CNG rolling stock. The fueling agreement is valued at a not-to-exceed price of \$5.5 million with a three-year term, with an option to extend the fueling contract for an additional three years. The fueling station was operational in September 2015, and Freedom built that CNG station adjacent to METRO's bus operations and support facility at 303 Fallbrook Drive in Houston, where in addition to fueling the buses, Freedom CNG will offer public access fueling to commercial fleets and passenger vehicles. Freedom CNG is building the station in collaboration with CenterPoint Energy Services. METRO will fuel its New Flyer CNGs at a public CNG station until the Freedom station is opened. METRO ordered the New Flyer CNG buses in September 2013, part of an order for 265 40-foot buses that also included diesel buses. The transit agency had tested four NatGas buses a decade ago but found them too costly to operate. Instead, METRO focused on deploying a diesel-electric hybrid bus fleet, and today about 35 percent of the 1,250 buses in METRO's fleet are diesel-hybrids, according to AFV Intelligence's North American Transit Agency Bus Census and Alternative Fuels Digest.
Mass Transit	Improve fuel economy and reduce CO2 from bus and/or light rail	Switch buses to hybrid engines	Programme/Project	Currently in effect (city-wide)	Yes	METRO has 1,230 buses. With an extensive network of bus routes and convenient Park & Ride facilities helping to ease rush-hour commutes, the METRO Bus System keeps the Houston region moving. METRO is paving the way for a cleaner Houston with 443 transit diesel-hybrid buses in operation. Since 2003, METRO has been actively working to improve the air we breathe with state-of-the-art technology that reduces nitrogen oxide emissions by more than 50 percent and offers substantial savings in fuel. Hybrid technology is METRO's current choice for vehicles and each year, as part of its fleet replacement plan, METRO purchases 100 buses.
Mass Transit	Improve fuel economy and reduce CO2 from trucks	Introduce low carbon waste collection vehicles	Procurement	Currently in effect at a significant scale across most of the city	Yes	Solid waste has 10 hybrid trucks in its fleet.
Mass Transit	Improve rail, metro, and tram infrastructure, services and operations	Improve rail transit times	Programme/Project	Currently in effect (city-wide)	Yes	Lightrail offers more reliability and is an improvement over bus transit times. METRO will also be celebrating its 100 millionth light rail rider in 2013.
Mass Transit	Improve rail, metro, and tram infrastructure, services and operations	Improve station facilities	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	In May 2015, the Metropolitan Transit Authority of Harris County (METRO) opened two new light rail lines, the Green and Purple lines, in Houston to bring the total system length to 23 miles, spending over \$4 billion to improve the system. The expanded light-rail system is an essential element of the city's plans to meet the transportation and environmental challenges, easing the growing traffic congestion, improving our air quality and changing the way Houston moves. Upgrades of existing station facilities will match the new facilities. Facility upgrades include security upgrades (HD camera), updated fare equipment on the platform, and new communication equipment.
Mass Transit	Improve rail, metro, and tram infrastructure, services and operations	Increase number of carriages	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Houston is expanding its light-rail infrastructure with three new light-rail lines currently under construction and two more in the works, going from 7.5 miles to 23 miles, spending over \$4 billion to improve the system. METRO will be adding 19 new Siemens H2 S70 trains to its light rail fleet.
Mass Transit	Improve rail, metro, and tram infrastructure, services and operations	Increase routes, frequency and night services	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Houston is expanding its light-rail infrastructure with a \$4 billion investment. Three new light-rail lines are currently under construction, and two more are in the works, going from 7.5 miles to 23 miles. Night services will match existing schedules, and frequency will remain at 6 minute intervals. METRO has a 1 percent sales and use tax imposed within METRO's service area for transit activities. By voter mandate, METRO dedicates 25 percent of its sales tax for the General Mobility Program. Most of this funding is passed on to the city of Houston, Harris County and 14 multi-cities for general mobility projects.

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Mass Transit	Improve rail, metro, and tram infrastructure, services and operations	Increase the number of rail stations	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Houston is expanding its light-rail infrastructure with a \$4 billion investment. Three new light-rail lines are currently in operation. There are a total of 24 new stations that opened in 2015, 10 on the Southeast Line, 5 on the East End Line, 8 on the North line, and 1 on the existing Main Street Line. METRO has a 1 percent sales and use tax imposed within METRO's service area for transit activities. By voter mandate, METRO dedicates 25 percent of its sales tax for the General Mobility Program. Most of this funding is passed on to the city of Houston, Harris County and 14 multi-cities for general mobility projects.
Mass Transit	Improve rail, metro, and tram infrastructure, services and operations	Reduce fares	Incentive /Disincentive	Currently in effect at a significant scale across most of the city	Yes	The City of Houston offers an incentive for downtown municipal employees. The Downtown Employee Parking/Transit policy (AP: 3-6) states that each employee working in downtown is offered a parking space or METRO transit pass.
Mass Transit	Smart public transport	Bike scheme systems that track availability of bikes and locations for drop off	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	The City launched its bike share program, Houston Bike Share, in May 2012, which is an active transportation alternative 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 29 stations and from 18 to 225 bicycles. This Phase II expansion creates a presence not only in Downtown, but also in the East End, Midtown, Montrose and the Museum District/Hermann Park with four of the stations located at key METRO Rail 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. <a href="http://www.houston.bcycle.com">www.houston.bcycle.com</a> The bike share system tracks availability of bikes and where the bikes can be docked via a mobile app or the website. There are currently 29 stations and 225 bikes in operation.
Mass Transit	Smart public transport	Electric vehicle charging station mapping and real-time booking system	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	The Houston Drives Electric website updates its charging station map periodically to show where public EV charging is available. The City is a partner in the Center for Commercialization of Electric Technologies and helped with the Texas Triangle Plug-in Electric Vehicle Readiness Plan, which was released in October 2012. Appendix 3B summarizes activities that encourage or facilitate PEVs and outline the number of existing PEVs and equipment in the Houston region. <a href="http://www.greenhoustontx.gov/ev/">http://www.greenhoustontx.gov/ev/</a>
Mass Transit	Smart public transport	Matching systems for carpooling/ car sharing	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	NuRide is the nation's largest rewards program for individuals who utilize commute alternatives by carpooling, vanpooling, biking, walking, telecommuting and taking public transportation. NuRide is a free service that can match carpoolers who live and work near each other as well as provide rewards and special offers to all NuRide members who track trips. NuRide is supported by the Houston-Galveston Area Council and local and national sponsors.
Mass Transit	Smart public transport	Road pricing that is responsive to real-time information	Incentive /Disincentive	Currently in effect at a significant scale across most of the city	Yes	METRO HOT (High Occupancy Toll) Lanes allow drivers without passengers (single-occupant vehicles or SOVs) to use the HOV (High Occupancy Vehicle) Lane – for a toll. Traffic monitoring systems help METRO maintain traffic speeds to ensure optimal travel times for existing HOV Lane users, as well those using the METRO HOT Lanes. If speeds slow, single-occupant vehicles are not allowed in the HOV Lane. The lane is also closed during peak traffic periods – specific to each METRO HOT Lane corridor - to single-occupant vehicles. METRO HOT Lanes benefits: - Provides new options for commuters -Increases safety and promotes quick response to accidents and issues in the lanes, thanks to additional camera monitoring -Improves air quality by reducing traffic congestion -Better utilizes existing HOV Lanes -Offers increased enforcement of the HOV Lane system -Revenue generated from tolls will contribute to the operation, maintenance and enforcement costs for METRO HOT Lanes Toll rates are based on time of day and the congestion level of each METRO HOT Lane. METRO will publish the toll rate for specific corridors prior to opening, and tolls will be prominently displayed along each corridor. <a href="http://www.ridemetro.org/Services/HOTLanes/FAQs.aspx">http://www.ridemetro.org/Services/HOTLanes/FAQs.aspx</a>
Mass Transit	Smart public transport	Smart card ticketing	Programme/Project	Currently in effect (city-wide)	Yes	The METRO Q® Fare Card is an electronic wallet for METRO riders. This unique card contains a computer chip that stores riders' cash balance directly onto the card. Fares are automatically deducted from the card each time a person rides, just like a debit card. The METRO Q®, which stands for "quick," also provides free transfers and tracks progress toward earning five free trips for every 50 paid trips.
Mass Transit	Smart public transport	Smart phone apps for real-time bike and pedestrian routes	Programme/Project	Still under consideration or awaiting final authorisation	Yes	An app for bike and ped routes has been discussed and is under consideration.
Mass Transit	Smart public transport	Tele-commuting/ flexible work schedules	Programme/Project	Currently in effect and being piloted	Yes	For City of Houston departments, opportunities for teleworking, flexible schedules, and compressed work weeks differ by department. The Houston-Galveston Area Council oversees the Regional Telework Program and offers free consulting services through the Commute Solutions Program to help start companies with their telework program or expand their existing telework program. They have also developed an Employer Telework Kit and offer grants to businesses wanting to begin or expand their teleworking program. <a href="http://www.mysolutionis.com/hr-management/telework/default.aspx">http://www.mysolutionis.com/hr-management/telework/default.aspx</a>
Outdoor Lighting	LED / CFL / other luminaire technologies	More efficient luminaires (e.g. LED)	Programme/Project	Currently in effect (city-wide)	Yes	It was announced in May 2014 that CenterPoint Energy, in partnership with the City of Houston, will convert approximately 165,000 streetlights from high pressure sodium, mercury vapor and metal halide to light-emitting diode (LED) technology. This replacement project, the largest in the nation, will reduce the City's streetlight energy usage by approximately 50 percent, reduce the City's municipal greenhouse gas emissions (GHG) by five percent and save the City over \$28 million over the life of the project.
Outdoor Lighting	Smart lighting	Sensor-based lighting	Programme/Project	Currently in effect (city-wide)	Yes	All streetlights are retrofitted with photocell technology in order to deliver lighting based on need.

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Private Transport	Awareness and education for non motorized transport	Cycle training	Programme/Project	Currently in effect (city-wide)	Yes	The City of Houston is proud to be a partner with the League of American Bicyclists (LAB) in the development of this online course to represent the classroom portion of the League's Traffic Skills 101 course. The BikeEd program is designed to develop the craft and science of bicycling, the ability to use a bicycle with confidence and competence for pleasure, utility and sport under various roadway, climate and traffic conditions. It is the nation's first free online bicyclist education course. <a href="http://www.bikeed.org/">http://www.bikeed.org/</a> Bike Texas, a statewide non-profit organization, has developed a comprehensive bicycle and pedestrian safety education curriculum designed for fourth and fifth grade elementary schools. The SafeCyclist Certification Training provides teachers, public safety and youth professionals with bicycle and pedestrian safety interactive lessons and the curriculum needed to teach these life-saving skills to their students. A training session was held in July 2012 at the Houston Permitting Center. There are also programs like the Ready2Roll Cycling series, where participants learn proper riding techniques, safety etiquette, riding in groups, and basic bicycle maintenance.
Private Transport	Awareness and education for non motorized transport	School and workplace travel plans	Programme/Project	Currently in effect (city-wide)	Yes	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. In addition, Harris County and many municipal utility districts have constructed over 160 miles of bikeways within the City limits.
Private Transport	Improve fuel economy and reduce CO2 from motorized vehicles	Electric vehicle charging infrastructure	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Participation in the DOE's EV Project added around 100 more Ecotality's Blink charging stations in Houston, including 39 at the airports and 29 in downtown Houston. Through this program, participants, including the City of Houston and other businesses, received charging stations at no cost and an additional credit to install the charging station. The EV Project goal is to collect and analyze data to characterize vehicle use in diverse topographic and climatic conditions, evaluate the effectiveness of charge infrastructure, and conduct trials of various revenue systems for commercial and public charge infrastructures. The Houston Drives Electric website updates its charging station map periodically to show where public EV charging is available. The City is a partner in the Center for Commercialization of Electric Technologies and helped with the Texas Triangle Plug-in Electric Vehicle Readiness Plan, which was released in October 2012. Appendix 3B summarizes activities that encourage or facilitate PEVs and outline the number of existing PEVs and equipment in the Houston region. Links to Volume 1-3 of the plan are included. The City also released guidelines and long range plans to guide electric vehicle charging station deployment. (Link to attachments included) -Electric Vehicle Deployment Guidelines -Long Range Electric Vehicle plan -Micro-Climate plan The City has also streamlined the EVSE permitting process for residential installations. <a href="http://www.greenhoustontx.gov/ev/">http://www.greenhoustontx.gov/ev/</a>
Private Transport	Improve fuel economy and reduce CO2 from motorized vehicles	Incentives/ rebates to switch personal vehicles to electric vehicles	Programme/Project	Currently in effect (city-wide)	Yes	The city uses its Houston Drives Electric initiative to educate the public about electric vehicles. <a href="http://www.greenhoustontx.gov/ev/">http://www.greenhoustontx.gov/ev/</a> The City is a partner in the Center for Commercialization of Electric Technologies and helped with the Texas Triangle Plug-in Electric Vehicle Readiness Plan, which was released in October 2012. Appendix 3B summarizes activities that encourage or facilitate PEVs and outlines the number of existing PEVs and equipment in the Houston region. <a href="http://www.electrictechologycenter.com/pdf/Volume%201%20CCET%20-%20Texas%20Triangle%20Plan%20Oct%202012.pdf">http://www.electrictechologycenter.com/pdf/Volume%201%20CCET%20-%20Texas%20Triangle%20Plan%20Oct%202012.pdf</a> <a href="http://www.electrictechologycenter.com/pdf/Volume%202%20CCET%20-%20Texas%20Triangle%20Plan%20Oct%202012.pdf">http://www.electrictechologycenter.com/pdf/Volume%202%20CCET%20-%20Texas%20Triangle%20Plan%20Oct%202012.pdf</a> <a href="http://www.electrictechologycenter.com/pdf/Volume%203%20CCET%20-%20Texas%20Triangle%20Plan%20Oct%202012.pdf">http://www.electrictechologycenter.com/pdf/Volume%203%20CCET%20-%20Texas%20Triangle%20Plan%20Oct%202012.pdf</a> The City has also streamlined the EVSE permitting process for residential installations.
Private Transport	Improve fuel economy and reduce CO2 from motorized vehicles	Incentives/ rebates to switch personal vehicles to hybrid engines	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	The City has the 4th largest municipal hybrid fleet in the nation. Approximately 50 percent of the City's nonspecialty, light-duty fleet have been replaced with hybrid vehicles. The City also has 26 Nissan Leafs in its fleet and 15 plug-in hybrids.
Private Transport	Improve fuel economy and reduce CO2 from motorized vehicles	Incentives/ rebates to switch personal vehicles to other lower-carbon fuel	Programme/Project	Currently in effect and being piloted	Yes	Houston Biodiesel educates about and promotes the use of clean, renewable, non-toxic, non-flammable, and domestically produced biodiesel.
Private Transport	Improve the operations of shipping ports	Fuel switching	Policy	Currently in effect (city-wide)	Yes	Emission controls are regulated by the Environmental Protection Agency. All ships have to fuel switch within 200 nautical miles of the coast of the US per federal regulations. On March 26, 2010, the International Maritime Organization (IMO) officially designated waters off North American coasts as an area in which stringent international emission standards will apply to ships. For this area, the effective date of the first-phase fuel sulfur standard is 2012, and the second phase begins in 2015. Beginning in 2016, NOx after treatment requirements become applicable. <a href="http://www.epa.gov/otaq/regs/nonroad/marine/ci420f10015.pdf">http://www.epa.gov/otaq/regs/nonroad/marine/ci420f10015.pdf</a>
Private Transport	Improve the operations of shipping ports	Hotelling/ port electrification	Programme/Project	Currently in effect and being piloted	Yes	The infrastructure is available for port electrification at the Bayport Terminal.
Private Transport	Improve the operations of shipping ports	Labelling programs	Policy	Currently in effect (city-wide)	Yes	Any product or good that crosses the docks of the Port of Houston must be labeled. Gaseous or liquids must be labeled, and Material Safety Data Sheets must be on the container or drum. At the Port of Houston Authority, anti-idling is currently an incentive/disincentive that will turn into a policy by the end of 2013. Developed by the Regional Air Quality Planning Committee, there is a 5-minute idling limit currently in place; however, enforcement is being developed. Signage is in place to inform port users of the idling limit.
Private Transport	Improve the operations of shipping ports	More efficient vehicles	Incentive /Disincentive	Currently in effect (city-wide)	Yes	The Port of Houston Authority has specific programs being developed to enhance the turnover of vehicles to be more efficient.
Private Transport	Infrastructure for non motorized transport	Cycle hire/ share programs	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	The City launched its bike share program, Houston Bike Share, in May 2012, which is an active transportation alternative 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 29 stations and from 18 to 225 bicycles. This Phase II expansion creates a presence not only in Downtown, but also in the East End, 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. There are currently 29 stations and 225 bikes in operation. <a href="http://www.houston.bicycle.com">www.houston.bicycle.com</a>

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Private Transport	Infrastructure for non motorized transport	Cycle parking	Policy	Currently in effect and being piloted	Yes	There is no existing data, but the Planning Department will be tracking new bike parking going forward as new projects get permitted. The department will work with GIS staff to consider ways to present the data. Also, the City and cycling advocacy group, Bike Houston, are evaluating how to document existing bicycle parking locations.
Private Transport	Infrastructure for non motorized transport	Cycle priority at traffic lights	Programme/Project	Currently in effect and being piloted	Yes	In March 2015, the City of Houston opened the Lamar Cycle Track, the City's first two-way protected bike lane. There is priority lighting for cyclists on the Cycle Track. <a href="https://edocs.publicworks.houstontx.gov/documents/divisions/ecd/bikeway/park_connector_one_page_overview.pdf">https://edocs.publicworks.houstontx.gov/documents/divisions/ecd/bikeway/park_connector_one_page_overview.pdf</a> There is a pilot project at the intersection of Sawyer and Spring. When a cyclist activates the signal, the cyclist gets a 7-second advanced signal before vehicle traffic.
Private Transport	Infrastructure for non motorized transport	Cycle signage	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	There are 164 miles of signed bike routes.
Private Transport	Infrastructure for non motorized transport	Dedicated cycle lane	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	In March 2015, the City of Houston opened the Lamar Cycle Track, the City's first two-way protected bike lane. There is priority lighting for cyclists on the Cycle Track. <a href="https://edocs.publicworks.houstontx.gov/documents/divisions/ecd/bikeway/park_connector_one_page_overview.pdf">https://edocs.publicworks.houstontx.gov/documents/divisions/ecd/bikeway/park_connector_one_page_overview.pdf</a> In November 2012, city voters passed a bond referendum for the Bayou Greenways Initiative. Over the next ten years, the Bayou Greenways will add new and equitably distributed green spaces and will also complete 150 miles of continuous all-weather hike and bike trails that will meander through those greenways. 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. In 2013 the City passed a Safe Passing ordinance to keep bicyclists and pedestrians safer on city streets. In 2014 the City and BikeHouston joined forces to launch a major bike safety campaign, Goal Zero, to enforce and educate motorists and cyclists about the Safe Passing ordinance, as well as create a Houston Bike Plan for the City. The Houston Bike Plan will help make Houston a safer, healthier, more bike-friendly city. The Plan will clarify a vision and goals for biking in Houston and identify future projects to create a citywide bicycle network. This improved citywide network will serve a broader spectrum of people who bike at all skill levels, providing more transportation choices, with both on-street and off-street facilities and building on current efforts to create a well-connected citywide bicycle system. ( <a href="http://houstonbikeplan.org/">http://houstonbikeplan.org/</a> ) The City helped pass a law, working with CenterPoint, to allow hike and bike trails along utility rights of way, which will provide a clear path of open space in Houston's urban setting. New trails will help create a complete network of off-street bicycle paths for Houston. The City has launched Cigna Sunday Streets HTx. Streets are opened to bicyclists, pedestrians, families, etc and closed to car traffic. ( <a href="http://www.gohealthyhouston.org/sundaystreetshtx/">http://www.gohealthyhouston.org/sundaystreetshtx/</a> )
Private Transport	Infrastructure for non motorized transport	Improve pedestrian crossings	Policy	Currently in effect (city-wide)	Yes	Chapter 42 relating to the City's land development ordinance provides guidelines on appropriate sidewalk widths and encourages connectivity. <a href="http://www.houstontx.gov/planning/DevelopRegs/dev_regs_links.html">http://www.houstontx.gov/planning/DevelopRegs/dev_regs_links.html</a> In the City's Infrastructure Design Manual, Appendix 2 presents a "Street Design Menu" with examples of optional roadway corridor sections that are a result of the 2009 City of Houston Mobility Planning Study. The recommended street cross sections show a multi-modal approach to street design and offer improved pedestrian crossings. <a href="http://documents.publicworks.houstontx.gov/documents/design_manuals/idm.pdf">http://documents.publicworks.houstontx.gov/documents/design_manuals/idm.pdf</a>
Private Transport	Infrastructure for non motorized transport	Create pedestrian plazas	Programme/Project	Currently in effect and being piloted	Yes	In the 2008-2011 TIP, the Transportation Policy Council committed \$1.5 million to fund Livable Center studies in the region. The goal of the Houston-Galveston Area Council's Livable Centers Program is to help create walkable, mixed-use places that provide multi-modal transportation options, improve environmental quality, and promote economic development. Many of the studies include proposals for pedestrian plazas and other pedestrian recommendations. <a href="http://www.h-gac.com/community/livablecenters/planningstudies/current/default.aspx">http://www.h-gac.com/community/livablecenters/planningstudies/current/default.aspx</a>
Private Transport	Infrastructure for non motorized transport	Shared cycle lane	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	There are 165 miles of shared lane markings, including lanes on Washington Avenue and Navigation Blvd, Antoine, Brittmore, and West Dallas. <a href="http://houstonbikeplan.org/wp-content/uploads/2016/02/HBP-Chapter-5-Network-Map.pdf">http://houstonbikeplan.org/wp-content/uploads/2016/02/HBP-Chapter-5-Network-Map.pdf</a>
Private Transport	Infrastructure for non motorized transport	Walking maps and signage	Programme/Project	Still under consideration or awaiting final authorisation	Yes	City Mobility Planning is a joint initiative between the departments of Planning & Development and Public Works & Engineering (PWE) in partnership with the Houston-Galveston Area Council the regions Metropolitan Planning Organization (MPO). The City of Houston is trying to get ahead of transportation challenges. The Houston Planning Commission has established several committees to examine a range of development and growth issues. One of the committees, the General Plan committee, established mobility and drainage as top priorities and recommended a programmatic framework to address these issues. City Mobility Planning (CMP) will be the framework for evaluating transportation issues in the city and extra-territorial Jurisdiction (ETJ). Part of the study looked at ways to improve intersections and access to trail networks. <a href="http://www.houstontx.gov/planning/DevelopRegs/mobility/CMP.html">http://www.houstontx.gov/planning/DevelopRegs/mobility/CMP.html</a> In November, 2012, city voters passed a bond referendum for the Bayou Greenways Initiative. Over the next ten 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. This project will incorporate pedestrian signage.
Private Transport	Transportation demand management	Congestion/ pollution charging	Programme/Project	Currently in effect (city-wide)	Yes	METRO HOT (High Occupancy Toll) Lanes allow drivers without passengers (single-occupant vehicles or SOVs) to use the HOV (High Occupancy Vehicle) Lane – for a toll. Traffic monitoring systems help METRO maintain traffic speeds to ensure optimal travel times for existing HOV Lane users, as well those using the METRO HOT Lanes. If speeds slow, single-occupant vehicles are not allowed in the HOV Lane. The lane is also closed during peak traffic periods – specific to each METRO HOT Lane corridor - to single-occupant vehicles. METRO HOT Lanes benefits: - Provides new options for commuters -Increases safety and promotes quick response to accidents and issues in the lanes, thanks to additional camera monitoring -Improves air quality by reducing traffic congestion -Better utilizes existing HOV Lanes -Offers increased enforcement of the HOV Lane system -Revenue generated from tolls will contribute to the operation, maintenance and enforcement costs for METRO HOT Lanes Toll are based on time of day and the congestion level of each METRO HOT Lane. METRO will publish the toll rate for specific corridors prior to opening, and tolls will be prominently displayed along each corridor. <a href="http://www.ridemetro.org/Services/HOTLanes/FAQs.aspx">http://www.ridemetro.org/Services/HOTLanes/FAQs.aspx</a>

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Private Transport	Transportation demand management	Increase vehicle registration fees	Policy	Still under consideration or awaiting final authorisation	No	The Houston-Galveston Area Council have made efforts at increasing fuel tax and insurance.
Private Transport	Transportation demand management	Personalized walking travel planning	Programme/Project	Currently in effect (city-wide)	Yes	The Houston-Galveston Area Council Pedestrian-Bicyclist Program coordinates programs and projects that improve mobility and safety for pedestrians and bicyclists throughout the region. The Regional Bikeway Viewer is an interactive map of existing and planned bikeways in the Houston-Galveston region. Users can see the regional bikeway network in its entirety, or zoom in for a closer look at specific areas of interest. The City of Houston's Bikeway Program designs, constructs, and maintains of a citywide network of bicycle routes integrated into an overall transportation network for the Houston area. The program offers more than 300 miles of interconnected bikeway network spanning across 500 square miles. The bikeway network consists of off-road hike and bike trails, on-street bike lanes and on-street bike routes. The Houston Bikeway Network Map includes more than 300 miles of the most current on-street and off-street facilities as well as trails. <a href="http://www.mysolutionis.com/residents/commuter-services/biking-and-walking.aspx">http://www.mysolutionis.com/residents/commuter-services/biking-and-walking.aspx</a>
Private Transport	Transportation demand management	Restrict parking	Programme/Project	Still under consideration or awaiting final authorisation	Yes	Public Works & Engineering restricts parking based on times and location. Where expected traffic volumes are greatest, permanent parking is not allowed; however, some on-street parking is allowed where non-peak hour volumes allow for it. The City's Administration & Regulatory Affairs is in charge of providing fees and managing meters.
Private Transport	Transportation demand management	Road tolls	Programme/Project	Currently in effect (city-wide)	Yes	The Harris County Toll Road Authority system consists of approximately 120 miles of roadway in the Houston / Harris County area and 12 miles in Ft. Bend County, for a total of 132 miles. The Westpark Tollway, Katy Managed Lanes and the Northeast section of the Sam Houston Tollway are all-electronic tolling. All-electronic tolling means there are no toll booths, and no cash payment is accepted. An EZ TAG or other interoperable Texas toll payment tag is required. "Managed lanes" refers to a mixed-use facility dedicated to mass transit, high occupancy vehicles (HOV), and also allows for tolling. In this case, METRO vehicles are granted free usage 24-hours a day, and HOVs are granted free usage in both directions of travel during peak times-Monday through Friday, 5am - 11am and 2pm - 8pm. Single occupancy vehicles (SOV) are allowed to use the lanes 24 hours a day for a toll, which will be charged electronically via an EZ TAG or other interoperable Texas toll payment tag. During HOV hours, drivers will need to choose their designated lane based on the occupancy of their vehicle. Rates are posted on message boards at all entrances. The lanes serve as an all-electronic tollway for all vehicles (except mass transit) during all other times. In order to maintain an optimum level of service on the facility at all times, toll rates for the managed lanes are based on time of day, vehicle occupancy and axle count. <a href="https://www.hctra.org/tollroads/">https://www.hctra.org/tollroads/</a>
Private Transport	Transportation demand management	School and workplace walking travel plans	Programme/Project	Currently in effect (city-wide)	Yes	Biking and walking are fun, healthy commute alternatives that energize individuals and employees while reducing traffic congestion and air pollution. Houston-Galveston Area Council Commute Solutions encourages these two alternatives by providing rewards for bicycle and pedestrian commuting trips ( <a href="http://www.nuride.com">www.nuride.com</a> ), trail maps. <a href="http://www.mysolutionis.com/residents/commuter-services/biking-and-walking.aspx">http://www.mysolutionis.com/residents/commuter-services/biking-and-walking.aspx</a>
Waste	Recycling or composting collections and/or facilities	Residential non-organic waste: Reuse schemes	Programme/Project	Currently in effect (city-wide)	Yes	The Building Materials Reuse Warehouse, a component of the City of Houston Solid Waste Management Department, benefits the community by providing space for excess building materials that would otherwise be dumped in local landfills. The Reuse Warehouse only accepts building material that is in suitable condition for reuse. <a href="http://www.houstontx.gov/solidwaste/reuse.html">http://www.houstontx.gov/solidwaste/reuse.html</a>
Waste	Recycling or composting collections and/or facilities	Residential non-organic waste: Municipal recycling points or centers	Programme/Project	Currently in effect (city-wide)	Yes	The City currently operates multiple drop-off locations for residents to bring recyclable materials.
Waste	Recycling or composting collections and/or facilities	Residential waste: Electronic waste recycling	Programme/Project	Currently in effect (city-wide)	Yes	The City currently collects ewaste at three permanent locations, and also hosts drop-off events for different areas through out the year. The City also responsibly e-cycles all of its municipal waste.
Waste	Recycling or composting collections and/or facilities	Residential waste: Incentives for recycling	Programme/Project	Currently in effect and being piloted	No	The City has also participated in an incentive program called Recycle Bank that offers rewards in the form of coupons to residents for recycling.
Waste	Recycling or composting collections and/or facilities	Collection for dry recyclables (glass, plastic, paper)	Programme/Project	Currently in effect (city-wide)	Yes	In February 2015, the City delivered 96-gal recycling carts to residents in the Southeast community of Pecan Park, fulfilling the goal of city-wide automated curbside recycling for all residents with City of Houston solid waste collection. Council Member Robert Gallegos and City officials were also on hand to celebrate the final expansion and success of the Automated Recycling Program (ARP). In addition to the Automated Recycling Program, the City has implemented several other recycling initiatives including opening two new Neighborhood Depository & Recycling Centers, opening the Reuse Warehouse which diverts building material from the landfill, implementing the Business Recycling Program, implementing the Compostable Bag Program, installing Big Belly Solar Compactors and building partnerships with the private sector, such as Living Earth to recycle yard and tree waste, Cherry Companies to recycle concrete, the Houston Furniture Bank to recycle mattresses, CompuCycle to recycle electronics, the Carton Council to recycle shelf-stable & refrigerated cartons and American Textile Recycling Services to recycle textiles, clothes and shoes. <a href="http://houstontx.gov/solidwaste/press/mayor-annise-parker-delivers-promise-goal-met-city-wide-automated-curbside-recycling">http://houstontx.gov/solidwaste/press/mayor-annise-parker-delivers-promise-goal-met-city-wide-automated-curbside-recycling</a>
Waste	Recycling or composting collections and/or facilities	Collection for organic compostable waste	Programme/Project	Currently in effect (city-wide)	Yes	Residents may dispose of their Tree Waste at their curbside. Tree Waste is collected during ODD numbered months. This method of collecting large waste comes with the benefits of diverting materials that can be recycled from landfills, saving landfill space and valuable tax dollars. "Tree Waste" is defined as "clean" wood waste such as tree limbs, branches, and stumps.

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Waste	Recycling or composting collections and/or facilities	Composting agricultural waste	Incentive /Disincentive	Still under consideration or awaiting final authorisation	Yes	Anearobic organic waste treatment plan has capacity for treatment of agricultural and commercial organic waste.
Waste	Recycling or composting collections and/or facilities	Construction and demolition waste: Promoting re-use	Programme/Project	Currently in effect (city-wide)	Yes	The Building Materials Reuse Warehouse, a component of the City of Houston Solid Waste Management Department, benefits the community by providing space for excess building materials that would otherwise be dumped in local landfills. The Reuse Warehouse only accepts building material that is in suitable condition for reuse. The city currently operates one location for the collection of gently used building materials that are then made freely available to non-profit organizations for reuse. <a href="http://www.houstontx.gov/solidwaste/reuse.html">http://www.houstontx.gov/solidwaste/reuse.html</a>
Waste	Recyclables and organics separation from other waste	Residential organic waste: Source separation policies	Policy	Currently in effect (city-wide)	No	Residents are required to place yard trimmings in city approved compostable bags for separate collection. In addition, every other month residents are provided collection of tree waste only on their heavy trash (bulky item) collection day. These materials are composted and mulched using a contracted private firm.
Waste	Recyclables and organics separation from other waste	Residential non-organic waste: Source separation policies	Programme/Project	Still under consideration or awaiting final authorisation	Yes	The City is working on a new innovation that would do the opposite of source separation, minimizing all separation, while achieving high recycling rates and diversion. One Bin for All would allow residents to discard all materials in one bin, treating trash as valuable assets, dramatically increasing recycling using game changing technologies. 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. Proven technologies (shredders, sensors, density separators and optical scanners) have been used previously in the waste, mining, or refining industries, but combined in a new process will yield a much higher recycling rate. This innovation will reduce greenhouse gas (GHG) emissions and improve air quality, provide an easy-to-use program for residents, save money and increase revenues. In the meantime, while One Bin for All is receiving approvals, etc., the City will continue to expand its single-stream recycling program (the bins can be used as the One Bin for the program in the future, so there will be no sunk costs). The program should expand to 30k households in 2013.
Waste	Waste prevention policies and programs	Residential waste: Outreach/informative programs	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	Community outreach programs include presentations to schools, neighborhood associations, business groups and more. The Solid Waste Department has mascots to represent recycling and encourage kids to get involved. The City has also participated in an incentive program called Recycle Bank that offers rewards in the form of coupons to residents for recycling.
Waste	Waste prevention policies and programs	Commercial waste: Waste collection fees	Programme/Project	Currently in effect and being piloted	Yes	For a fee, the city currently offers collection of recycling to small businesses near residential collection routes. This is a new program currently being piloted in a few areas with the intent to grow the program to more areas over time. <a href="http://www.houstontx.gov/solidwaste/business_recycling.html">http://www.houstontx.gov/solidwaste/business_recycling.html</a>
Waste	Waste prevention policies and programs	Commercial organic waste: Incentives for organics treatment	Incentive /Disincentive	Still under consideration or awaiting final authorisation	Yes	Anearobic organic waste treatment plan has capacity for treatment of agricultural and commercial organic waste.
Waste	Waste prevention policies and programs	Construction and demolition waste: Reduce dumping of waste	Programme/Project	Still under consideration or awaiting final authorisation	Yes	The City convened an Illegal Dumping Task Force to strategize ways to combat illegal dumping and to make recommendations as to how to improve this issue. Currently, residents may place up to 4 tires at the curb for collection during Junk Waste months. Collection crews will separate the tires from the Junk Waste. It may take up to a week before crews return and retrieve the tires. Separating the tires from the rest of the Junk Waste allows the SWMD to properly process tires.
Waste	Waste prevention policies and programs	Construction and demolition waste: Waste management plans on construction sites	Policy	Currently in effect at a significant scale across most of the city	Yes	The City has a Green Building Resolution, which sets a target of LEED-Silver certification for new construction, replacement facilities and major renovations of city of Houston-owned buildings and facilities with more than 10,000 square feet of occupied space. In the LEED Rating System, there are two credits that relate to construction waste management. Many projects in the community have achieved this credit.
Waste	Improve the efficiency of waste collection	Sectoral consolidated waste collection	Programme/Project	Currently in effect (city-wide)	Yes	In 2009, the Houston-Galveston Area Council held a workshop on the best management practices for transfer stations. The material presented was directed at both existing transfer station operators and those interested in developing a new transfer station.
Waste	Improve the efficiency of waste collection	Single waste stream collection	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	In February 2015, the City personally delivered 96-gal recycling carts to residents in the Southeast community of Pecan Park, fulfilling the goal of city-wide automated curbside recycling for all residents with City of Houston solid waste collection. Council Member Robert Gallegos and City officials were also on hand to celebrate the final expansion and success of the Automated Recycling Program (ARP). In addition to the Automated Recycling Program, the City implemented several other recycling initiatives including opening two new Neighborhood Depository & Recycling Centers, opening the Reuse Warehouse which diverts building material from the landfill, implementing the Business Recycling Program, implementing the Compostable Bag Program, installing Big Belly Solar Compactors and building partnerships with the private sector, such as Living Earth to recycle yard and tree waste, Cherry Companies to recycle concrete, the Houston Furniture Bank to recycle mattresses, CompuCycle to recycle electronics, the Carton Council to recycle shelf-stable & refrigerated cartons and American Textile Recycling Services to recycle textiles, clothes and shoes. <a href="http://houstontx.gov/solidwaste/press/mayor-annise-parker-delivers-promise-goal-met-city-wide-automated-curbside-recycling">http://houstontx.gov/solidwaste/press/mayor-annise-parker-delivers-promise-goal-met-city-wide-automated-curbside-recycling</a>

Emissions reduction sector	Emissions reduction activity	Emissions reduction action	Lever	Scale and status	Do you plan to expand this action in the future?	Action description
Water	Water metering and billing	Connection fees for new buildings	Policy	Currently in effect (city-wide)	Yes	Code enforcement has impact fees for connecting buildings to the City's water and sewer system.
Water	Water recycling and reclamation	Standards for connection to recycled water network	Policy	Currently in effect (city-wide)	Yes	Standards to use reclaimed water have been included in the Houston Amendments to the adopted 2006 Uniform Plumbing Code Ch. 16. Sec 1601.1.2. 1601.1.2 Allowable Use of Alternate Water. Where approved by the Authority Having Jurisdiction, alternate water sources (reclaimed (recycled) water, rainwater, gray water and onsite treated nonpotable water) shall be permitted to be used in lieu of potable water for the applications identified in this chapter. <a href="http://documents.publicworks.houstontx.gov/documents/divisions/planning/enforcement/06_upc_amendments.pdf">http://documents.publicworks.houstontx.gov/documents/divisions/planning/enforcement/06_upc_amendments.pdf</a>
Water	Water recycling and reclamation	Water recycling or reclamation	Programme/Project	Currently in effect and being piloted	Yes	Two golf courses take water from water treatment plants and use it for irrigation. Also, there are commercial/industrial treated water users who make great efforts to be water efficient.
Finance and Economic Development	Developing the green economy	Run competitions to promote the establishment of new green businesses	Programme/Project	Currently in effect (city-wide)	Yes	The Houston Green Office Challenge is a friendly competition for commercial office tenants that acknowledges participants for their achievements in greening their operations through Mayoral and media recognition. The Green Office Challenge helps participants move down the path towards environmental sustainability and, in some cases, towards third-party green building certification through the ENERGY STAR and LEED™ rating systems.
Private Transport	Improve fuel economy and reduce CO2 from trucks (private)	Incentives/ rebates to switch trucks to other lower-carbon fuel	Policy	Currently in effect (city-wide)	Yes	In November 2015, the City approved an ordinance that will improve Houston's quality of life and protect public health: an anti-idling ordinance for motor vehicles with a gross vehicle weight rating of more than 14,000 pounds. The covered vehicles are prohibited from idling for more than 5 minutes when not in motion. Idling is one contributor to air quality issues in the region. Nitrogen oxides (NOx), volatile organic compounds (VOCs), and particulate matter (PM) are emitted from vehicle engine exhaust and can form ground-level ozone, or smog. Diesel engines emit hazardous air pollutants which have been linked to serious illnesses, including asthma, heart disease, chronic bronchitis, and cancer. Children, elderly, and those with asthma and other chronic health problems are especially vulnerable to the health dangers of exhaust.
Finance and Economic Development	Developing the green economy	Run hackathon with the aim of helping green business startups	Programme/Project	Currently in effect at a significant scale across most of the city	Yes	In April 2016, the City of Houston will host its fourth annual citywide Hackathon at the Houston Technology Center on May 14-15. The Hackathon promotes collaboration across government and technology communities, engages Houston's citizen technologists to improve government and provides a platform for citizens to share innovative ideas with City decision makers. Last year, more than 400 coders, designers, entrepreneurs, students, activists and other civically engaged individuals participated in the Hackathon and developed creative and useful solutions for community challenges.
Finance and Economic Development	Instruments to fund low carbon projects	Establish a revolving fund for low carbon or green projects	Programme/Project	Still under consideration or awaiting final authorisation	Yes	In November 2015, the City approved a significant ordinance that will improve Houston's quality of life and protect public health: a commercial Property Assessed Clean Energy (PACE) program. PACE is financing that enables Houston owners of commercial, industrial and residential properties with five or more units to obtain low-cost, long-term loans for water conservation, energy-efficiency, and renewable retrofits. In exchange for funds provided by a private lender to pay for the improvement, the property owner voluntarily requests that the local government place an assessment secured with a senior lien on the property until the assessment is paid in full. The benefits of PACE are multi-faceted, leading to a win for all stakeholders.

Page: GHG Emissions Reduction - Community II C40

7.4 Please provide some additional information on the city-wide actions you are taking.

Emissions reduction activity	Emissions reduction action	Which exchange most helped to deliver this action?	Anticipated emissions reduction – per annum at action end date (metric tonnes CO2e)	Anticipated emissions reduction – cumulative over the lifetime of the action (metric tonnes CO2e)	Primary (major) financial mechanism	Secondary financial mechanism	Total capital cost (\$USD)	Action start date (mm/yy)	Action end date (mm/yy)
Building performance rating and reporting	Commercial buildings and facilities: Audits and advice	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Building performance rating and reporting	Commercial buildings and facilities: Benchmarking	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Building performance rating and reporting	Commercial buildings and facilities: Energy performance certification	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Building performance rating and reporting	Commercial buildings and facilities: Smart meters	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Building performance rating and reporting	Residential - Private housing: Audits and advice	Working with cities in a specific C40 Network			Grants / subsidies			01/06	12/50
Building performance rating and reporting	Residential - Private housing: Benchmarking	Working with cities in a specific C40 Network			Grants / subsidies			01/06	12/50
Building performance rating and reporting	Residential - Private housing: Energy performance certification	Working with cities in a specific C40 Network			Grants / subsidies			01/06	12/50

Emissions reduction activity	Emissions reduction action	Which exchange most helped to deliver this action?	Anticipated emissions reduction – per annum at action end date (metric tonnes CO2e)	Anticipated emissions reduction – cumulative over the lifetime of the action (metric tonnes CO2e)	Primary (major) financial mechanism	Secondary financial mechanism	Total capital cost (\$USD)	Action start date (mm/yy)	Action end date (mm/yy)
Building performance rating and reporting	Residential - Private housing: Net metering	Working with cities in a specific C40 Network			Grants / subsidies			01/06	12/50
Building performance rating and reporting	Residential - Private housing: Smart meters	Working with cities in a specific C40 Network			Grants / subsidies			01/06	12/50
Energy efficiency/ retrofit measures	Commercial buildings and facilities: Building energy management system	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Energy efficiency/ retrofit measures	Commercial buildings and facilities: CFL or other efficient lighting mechanisms	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Energy efficiency/ retrofit measures	Commercial buildings and facilities: Daylighting	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Energy efficiency/ retrofit measures	Commercial buildings and facilities: Energy performance contracting	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Energy efficiency/ retrofit measures	Commercial buildings and facilities: Heating and cooling efficiency	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Energy efficiency/ retrofit measures	Commercial buildings and facilities: Insulation	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Energy efficiency/ retrofit measures	Residential - Private housing: HVAC operations & maintenance	Working with cities in a specific C40 Network			Grants / subsidies			01/06	12/50
Energy efficiency/ retrofit measures	Residential - Private housing: Installation of efficient lighting systems	Working with cities in a specific C40 Network			Grants / subsidies			01/06	12/50
Energy efficiency/ retrofit measures	Residential - Private housing: Insulation	Working with cities in a specific C40 Network			Grants / subsidies			01/06	12/50
On-site renewable energy generation	Residential - Private housing: Combined heat and power	Working with cities in a specific C40 Network			Grants / subsidies			01/06	12/50
On-site renewable energy generation	Residential - Private housing: Solar electricity	Working with cities in a specific C40 Network			Grants / subsidies			01/06	12/50
Switching to low-carbon fuels	Residential - Private housing: Purchasing of 'green' electricity from the grid	Working with cities in a specific C40 Network			Grants / subsidies			01/06	12/50
Brownfield redevelopment programs	Brownfield redevelopment, clean up or rehabilitation initiatives	None of the above			Grants / subsidies			01/05	12/50
Building standards	Green community rating system LEED-ND, GreenStar, Enterprise Communities, etc.	Working with cities in a specific C40 Network			City's own funds / savings			06/04	12/50
Compact cities	Minimum density requirements	None of the above			Grants / subsidies			01/12	12/50
Compact cities	Strategic refurbishment/ re-use of unused buildings for new purposes	None of the above			Developer contributions			01/10	12/50
Eco-district development strategy	District heating/cooling	None of the above			Developer contributions			01/95	12/50
Green space and/ or biodiversity preservation and expansion	Conservation or restoration of ecological corridors/connectivity	None of the above			Grants / subsidies			05/11	12/50
Green space and/ or biodiversity preservation and expansion	Conservation or restoration of natural/semi-natural areas	None of the above			Bond issuance (municipal bonds, green bonds, infrastructure bonds)			11/12	12/50
Green space and/ or biodiversity preservation and expansion	Home gardens/garden plots	None of the above			Grants / subsidies			01/10	12/50
Green space and/ or biodiversity preservation and expansion	Opening schoolyards for public use	None of the above			Grants / subsidies			01/83	12/50

Emissions reduction activity	Emissions reduction action	Which exchange most helped to deliver this action?	Anticipated emissions reduction – per annum at action end date (metric tonnes CO2e)	Anticipated emissions reduction – cumulative over the lifetime of the action (metric tonnes CO2e)	Primary (major) financial mechanism	Secondary financial mechanism	Total capital cost (\$USD)	Action start date (mm/yy)	Action end date (mm/yy)
Green space and/ or biodiversity preservation and expansion	Protection of large green and open spaces within the City	None of the above			Grants / subsidies			01/10	12/50
Green space and/ or biodiversity preservation and expansion	Reforestation	None of the above			Developer contributions			01/10	12/50
Green space and/ or biodiversity preservation and expansion	Stewardship of open spaces	None of the above			Developer contributions			11/12	12/50
Green space and/ or biodiversity preservation and expansion	Tree planting/Afforestation	None of the above			Developer contributions			01/10	12/50
Transit oriented development	Expanding transit to connect existing development	Working with cities in a specific C40 Network			Grants / subsidies			01/04	12/50
Transit oriented development	Prioritising development in areas well connected by transit	Working with cities in a specific C40 Network			Grants / subsidies			01/04	12/50
Transit oriented development	Restricting parking spaces in new development	Working with cities in a specific C40 Network			City's own funds / savings			01/04	12/50
Transit oriented development	Using current transportation infrastructure projects as focus for new neighbourhood development	Working with cities in a specific C40 Network			Grants / subsidies			01/04	12/50
Urban agriculture	Rooftop and vertical farming	None of the above			Grants / subsidies			01/10	12/50
Low or zero carbon energy supply generation	Advanced thermal treatment of biomass	Working with non-C40 cities			Grants / subsidies			N/A	N/A
Low or zero carbon energy supply generation	Anaerobic digestion	Working with non-C40 cities			Grants / subsidies			N/A	N/A
Low or zero carbon energy supply generation	Property tax rebate	Working with non-C40 cities			Grants / subsidies			09/09	12/50
Low or zero carbon energy supply generation	Solar electricity (photovoltaic, concentrating solar)	None of the above			Grants / subsidies			06/09	12/50
Optimize traditional power/ energy production	Heat generation asset replacement	None of the above			Grants / subsidies			01/10	12/50
Optimize traditional power/ energy production	Increased capture of waste heat	None of the above			Grants / subsidies			05/11	12/50
Smart grid	Development of smart grids	None of the above			Developer contributions			02/11	12/50
Smart grid	Smart meters/ controls	None of the above			Developer contributions			02/11	12/50
Smart grid	Smart street lighting	None of the above			Developer contributions			01/15	12/50
Encourage sustainable food production and consumption	Community gardens or allotments	None of the above			Grants / subsidies			01/10	12/50
Encourage sustainable food production and consumption	Rooftop farming	None of the above			Grants / subsidies			N/A	N/A
Improve bus infrastructure, services, and operations	Bus priority at traffic lights	Working with cities in a specific C40 Network			Grants / subsidies			06/09	12/50
Improve bus infrastructure, services, and operations	Bus rapid transit	Working with cities in a specific C40 Network			Grants / subsidies			06/09	12/50
Improve bus infrastructure, services, and operations	Increase routes, frequency and night services	Working with cities in a specific C40 Network			Grants / subsidies			08/15	12/50
Improve bus infrastructure, services, and operations	Increase the number of bus stops	Working with cities in a specific C40 Network			Grants / subsidies			08/15	12/50

Emissions reduction activity	Emissions reduction action	Which exchange most helped to deliver this action?	Anticipated emissions reduction – per annum at action end date (metric tonnes CO2e)	Anticipated emissions reduction – cumulative over the lifetime of the action (metric tonnes CO2e)	Primary (major) financial mechanism	Secondary financial mechanism	Total capital cost (\$USD)	Action start date (mm/yy)	Action end date (mm/yy)
Improve bus infrastructure, services, and operations	Priority lanes	Working with cities in a specific C40 Network			Grants / subsidies			08/15	12/50
Improve bus infrastructure, services, and operations	Provide more bus shelters	Working with cities in a specific C40 Network			Grants / subsidies			08/15	12/50
Improve bus infrastructure, services, and operations	Upgrade buses to increase accessibility	Working with cities in a specific C40 Network			Grants / subsidies			08/15	12/50
Improve fuel economy and reduce CO2 from bus and/or light rail	Improve rail, metro and tram fuel economy and reduce CO2	Working with cities in a specific C40 Network			Grants / subsidies			01/04	12/50
Improve fuel economy and reduce CO2 from bus and/or light rail	Promote fuel-efficient bus driving and reduce idling	Working with cities in a specific C40 Network			Grants / subsidies			09/06	12/50
Improve fuel economy and reduce CO2 from bus and/or light rail	Switch buses to Compressed Natural Gas	Working with cities in a specific C40 Network			Grants / subsidies			06/12	12/50
Improve fuel economy and reduce CO2 from bus and/or light rail	Switch buses to hybrid engines	Working with cities in a specific C40 Network			Grants / subsidies			06/10	12/50
Improve fuel economy and reduce CO2 from trucks	Introduce low carbon waste collection vehicles	Working with cities in a specific C40 Network			Grants / subsidies			03/08	12/50
Improve rail, metro, and tram infrastructure, services and operations	Improve rail transit times	Working with cities in a specific C40 Network			Grants / subsidies			01/04	12/50
Improve rail, metro, and tram infrastructure, services and operations	Improve station facilities	Working with cities in a specific C40 Network			Grants / subsidies			01/04	12/50
Improve rail, metro, and tram infrastructure, services and operations	Increase number of carriages	Working with cities in a specific C40 Network			Grants / subsidies			12/13	12/50
Improve rail, metro, and tram infrastructure, services and operations	Increase routes, frequency and night services	Working with cities in a specific C40 Network			Grants / subsidies			05/15	12/50
Improve rail, metro, and tram infrastructure, services and operations	Increase the number of rail stations	Working with cities in a specific C40 Network			Grants / subsidies			05/15	12/50
Improve rail, metro, and tram infrastructure, services and operations	Reduce fares	Working with cities in a specific C40 Network			Grants / subsidies			01/04	12/50
Smart public transport	Bike scheme systems that track availability of bikes and locations for drop off	Working with cities in a specific C40 Network			Grants / subsidies			05/12	12/50
Smart public transport	Electric vehicle charging station mapping and real-time booking system	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Smart public transport	Matching systems for carpooling/ car sharing	Working with cities in a specific C40 Network			Grants / subsidies			11/05	12/50
Smart public transport	Road pricing that is responsive to real-time information	Working with cities in a specific C40 Network			Grants / subsidies			01/14	12/50
Smart public transport	Smart card ticketing	Working with cities in a specific C40 Network			Grants / subsidies			01/04	12/50
Smart public transport	Smart phone apps for real-time bike and pedestrian routes	Working with cities in a specific C40 Network			Grants / subsidies			N/A	N/A
Smart public transport	Tele-commuting/ flexible work schedules	Working with cities in a specific C40 Network			Grants / subsidies			01/04	12/50
LED / CFL / other luminaire technologies	More efficient luminaires (e.g. LED)	Working with non-C40 cities			Developer contributions			01/15	12/50
Smart lighting	Sensor-based lighting	None of the above			Grants / subsidies			01/04	12/50

Emissions reduction activity	Emissions reduction action	Which exchange most helped to deliver this action?	Anticipated emissions reduction – per annum at action end date (metric tonnes CO2e)	Anticipated emissions reduction – cumulative over the lifetime of the action (metric tonnes CO2e)	Primary (major) financial mechanism	Secondary financial mechanism	Total capital cost (\$USD)	Action start date (mm/yy)	Action end date (mm/yy)
Awareness and education for non motorized transport	Cycle training	Working with non-C40 cities			Grants / subsidies			01/04	12/50
Awareness and education for non motorized transport	School and workplace travel plans	None of the above			Grants / subsidies			01/04	12/50
Improve fuel economy and reduce CO2 from motorized vehicles	Electric vehicle charging infrastructure	Working with cities in a specific C40 Network			Grants / subsidies			01/10	12/50
Improve fuel economy and reduce CO2 from motorized vehicles	Incentives/ rebates to switch personal vehicles to electric vehicles	Working with cities in a specific C40 Network			Grants / subsidies			01/10	12/50
Improve fuel economy and reduce CO2 from motorized vehicles	Incentives/ rebates to switch personal vehicles to hybrid engines	Working with cities in a specific C40 Network			Grants / subsidies			01/10	12/50
Improve fuel economy and reduce CO2 from motorized vehicles	Incentives/ rebates to switch personal vehicles to other lower-carbon fuel	Working with cities in a specific C40 Network			Grants / subsidies			01/10	12/50
Improve the operations of shipping ports	Fuel switching	None of the above			Grants / subsidies			04/10	12/50
Improve the operations of shipping ports	Hotelling/ port electrification	None of the above			Grants / subsidies			03/08	12/50
Improve the operations of shipping ports	Labelling programs	None of the above			Grants / subsidies			01/94	12/50
Improve the operations of shipping ports	More efficient vehicles	None of the above			Grants / subsidies			01/09	12/50
Infrastructure for non motorized transport	Cycle hire/ share programs	Working with non-C40 cities			Grants / subsidies			05/12	12/50
Infrastructure for non motorized transport	Cycle parking	None of the above			Grants / subsidies			01/04	12/50
Infrastructure for non motorized transport	Cycle priority at traffic lights	None of the above			Grants / subsidies			03/15	12/50
Infrastructure for non motorized transport	Cycle signage	None of the above			Grants / subsidies			03/15	12/50
Infrastructure for non motorized transport	Dedicated cycle lane	Working with non-C40 cities			Grants / subsidies			03/15	12/50
Infrastructure for non motorized transport	Improve pedestrian crossings	Working with non-C40 cities			City's own funds / savings			01/04	12/50
Infrastructure for non motorized transport	Create pedestrian plazas	Working with non-C40 cities			Grants / subsidies			01/04	12/50
Infrastructure for non motorized transport	Shared cycle lane	Working with non-C40 cities			Grants / subsidies			01/04	12/50
Infrastructure for non motorized transport	Walking maps and signage	Working with non-C40 cities			Grants / subsidies			01/04	12/50
Transportation demand management	Congestion/ pollution charging	None of the above			Grants / subsidies			01/14	12/50
Transportation demand management	Increase vehicle registration fees	None of the above			Grants / subsidies			01/14	12/50
Transportation demand management	Personalized walking travel planning	None of the above			Grants / subsidies			01/15	12/50
Transportation demand management	Restrict parking	None of the above			Grants / subsidies			01/15	12/50
Transportation demand management	Road tolls	None of the above			Grants / subsidies			07/90	12/50
Transportation demand management	School and workplace walking travel plans	None of the above			Grants / subsidies			01/15	12/50
Recycling or composting collections and/or facilities	Residential non-organic waste: Reuse schemes	Working with cities in a specific C40 Network			Grants / subsidies			01/04	12/50
Recycling or composting collections and/or facilities	Residential non-organic waste: Municipal recycling points or centers	Working with cities in a specific C40 Network			City's own funds / savings			01/04	12/50
Recycling or composting collections and/or facilities	Residential waste: Electronic waste recycling	Working with cities in a specific C40 Network			City's own funds / savings			01/04	12/50

Emissions reduction activity	Emissions reduction action	Which exchange most helped to deliver this action?	Anticipated emissions reduction – per annum at action end date (metric tonnes CO2e)	Anticipated emissions reduction – cumulative over the lifetime of the action (metric tonnes CO2e)	Primary (major) financial mechanism	Secondary financial mechanism	Total capital cost (\$USD)	Action start date (mm/yy)	Action end date (mm/yy)
Recycling or composting collections and/or facilities	Residential waste: Incentives for recycling	Working with cities in a specific C40 Network			City's own funds / savings			11/09	03/13
Recycling or composting collections and/or facilities	Collection for dry recyclables (glass, plastic, paper)	Working with cities in a specific C40 Network			City's own funds / savings			01/90	12/50
Recycling or composting collections and/or facilities	Collection for organic compostable waste	Working with cities in a specific C40 Network			City's own funds / savings			03/09	12/50
Recycling or composting collections and/or facilities	Composting agricultural waste	Working with cities in a specific C40 Network			City's own funds / savings			N/A	N/A
Recycling or composting collections and/or facilities	Construction and demolition waste: Promoting re-use	Working with cities in a specific C40 Network			Grants / subsidies			04/09	12/50
Recyclables and organics separation from other waste	Residential organic waste: Source separation policies	Working with cities in a specific C40 Network			City's own funds / savings			01/09	12/50
Recyclables and organics separation from other waste	Residential non-organic waste: Source separation policies	Working with cities in a specific C40 Network			City's own funds / savings			01/90	12/50
Waste prevention policies and programs	Residential waste: Outreach/informative programs	Working with cities in a specific C40 Network			City's own funds / savings			01/90	12/50
Waste prevention policies and programs	Commercial waste: Waste collection fees	Working with cities in a specific C40 Network			Grants / subsidies			01/12	12/50
Waste prevention policies and programs	Commercial organic waste: Incentives for organics treatment	Working with cities in a specific C40 Network			Grants / subsidies			01/12	12/50
Waste prevention policies and programs	Construction and demolition waste: Reduce dumping of waste	Working with cities in a specific C40 Network			Grants / subsidies			04/09	12/50
Waste prevention policies and programs	Construction and demolition waste: Waste management plans on construction sites	Working with cities in a specific C40 Network			Grants / subsidies			04/09	12/50
Improve the efficiency of waste collection	Sectoral consolidated waste collection	Working with cities in a specific C40 Network			City's own funds / savings			01/90	12/50
Improve the efficiency of waste collection	Single waste stream collection	Working with cities in a specific C40 Network			City's own funds / savings			03/09	12/50
Water metering and billing	Connection fees for new buildings	None of the above			Tolls / user charges			01/95	12/50
Water recycling and reclamation	Standards for connection to recycled water network	None of the above			Developer contributions			12/10	12/50
Water recycling and reclamation	Water recycling or reclamation	None of the above			Grants / subsidies			12/10	12/50
Developing the green economy	Run competitions to promote the establishment of new green businesses	Working with cities in a specific C40 Network			Grants / subsidies			10/11	12/50
Improve fuel economy and reduce CO2 from trucks (private)	Incentives/ rebates to switch trucks to other lower-carbon fuel	Working with other C40 cities			Tolls / user charges			11/15	12/50
Developing the green economy	Run hackathon with the aim of helping green business startups	None of the above			City's own funds / savings			05/16	12/50
Instruments to fund low carbon projects	Establish a revolving fund for low carbon or green projects	Working with other C40 cities			Loans			11/15	12/50

### Page: Renewable Energy C40

#### 8.0

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

Energy source	Percent
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Energy source	Percent
Coal	28.1%
Gas	48.4%
Oil	
Nuclear	11.3%
Hydro	0.20%
Biomass	0.20%
Wind	11.7%
Geothermal	
Solar	0.10%

**8.1**  
Does your city have a renewable energy or electricity target?

Yes - my city has a renewable energy target

**8.1b**  
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%	Other: 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-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. In December 2015, the City of Houston signed an agreement with Reliant Energy, an NRG Energy company, to increase its purchase of renewable power through at least June 2016. After the New Year, the City will work to negotiate another 12-month extension. With this change, the City's purchase of green power will account for 75% of its annual electricity demand. The City will be using more than 950,000 MWh of green power per year, which is equivalent to the amount of kilowatt-hours needed to more than 87,000 homes each year.

Page: Water Supply Risks C40

**9.0**  
Do you foresee substantive risks to your city's water supply in the short or long term?

Yes

**9.0.a**  
Please identify the risks to your city's water supply as well as the timescale and level of risk.

Risks	Timescale	Level of risk	Risk description
Inadequate or aging infrastructure	Current	Serious	In 2011, the state of Texas faced the most intense one-year drought since 1895. 90% of the state was categorized as being in an exceptional drought. The economic impact was significant with \$5.2 billion in agricultural losses. The City issued mandatory water restrictions for all residents and for the first time in 25 years began drawing water from Lake Conroe. The drought significantly impacted water infrastructure, power supply and the tree canopy. The drought exasperated the water infrastructure. The exceptional drought resulted in drying of the sub soil shifting much of the aged piping infrastructure; 40% of piping is greater than 50 years old. The 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. In 2012, 15% of Houston's water, 22.4 billion gallons, was leaked and never made it to the end-user. Also, much of the electricity sent to Houston is generated at plants requiring cooling water. ERCOT stated that 11 gigawatts of the state's power infrastructure rely on sources that are at historically low levels. Further, if significant rain had not come by May 2012, three gigawatts of power would have been brought offline, resulting in brownouts and blackouts. The drought also took a massive toll on trees. The Houston urban forest canopy lost approximately 66 million trees. Memorial Park, one of the most intensively used parks in the City lost 50% of its trees. This not only affects the aesthetics of the City, it also can significantly impact cooling. The loss of the urban canopy can increase the heat island effect exasperating the severe summer heat index.
Flooding	Current	Serious	Every part of the country must deal with the threat of natural disasters. For Harris County, an area that is prone to severe rainfall, is generally topographically flat and has impermeable clay soils, the No. 1 threat is flooding. This area has flooded long before the Allen brothers founded the city of Houston in 1836. Written excerpts from early settlers have helped document this area's flooding history: Jacob de Cordova, one of the early encyclopedists of Texas, wrote in 1858, "The principle objection to these lands is that in consequence of their extreme flatness they are often in the wet season covered with water." Houston has faced a number of significant rain-induced flooding events in recent decades, seeing an average of six each year since 1992. The city learns lessons from each event. Officials focus on improving responses to the flood itself and on creating better infrastructure to prevent or reduce the severity of future events. Since the Memorial Day flood in 2015, Houston has improved its preparedness by working with other government entities. Coordinating with the Army Corps of Engineers, the Texas Department of Transportation, and the Harris County Flood Control District, the city has worked to install new overflow basins and improve drainage. Joint communication with the public about the dangers of flooding has improved as these entities cooperate.

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**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 equaled 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>
Flooding	Stormwater management (natural or man-made infrastructure)	<p>The Harris County Flood Control District oversees 22 watersheds and approximately 1,500 bayous and creeks in Harris County. The way the local drainage system works is: stormwater travels through storm sewers and roadside ditches and flows into small tributaries and large tributaries, ultimately emptying into bayous, which carry the water to the Houston Ship Channel and then to Galveston Bay. The mission of the Flood Control District is to build flood damage reduction projects that work, with appropriate regard for community and natural values, building projects that reduce people's flooding risks. Since the 2015 Memorial Day flood, Houston has improved its preparedness by working with other government entities. Coordinating with the Army Corps of Engineers, the Texas Department of Transportation, and the Harris County Flood Control District, the city has worked to install new overflow basins and improve drainage. Joint communication with the public about the dangers of flooding has improved as these entities cooperate. The city also implemented Rebuild Houston in part to address flooding. The program raises funds to reconstruct the local streets and the drainage systems. In addition, the city has updated its water management design standards. While some residential areas will always face flood risk due to their proximity to Houston's bayou system, which operate as the city's flood valves, these efforts should improve drainage. Bayou Greenways 2020 is a \$220 million project that is a public-private partnership between Houston Parks Board, the Houston Parks and Recreation Department and the Harris County Flood Control District. When complete, Houston will have added more than 3,000 acres of new and equitably distributed green spaces that can also serve the function of flood control and storm water quality enhancement. There are numerous other benefits associated with utilizing our bayou corridors for green space and recreation:</p> <ul style="list-style-type: none"> <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> </ul>

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