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# Mayor's Office of Resilience and Sustainability

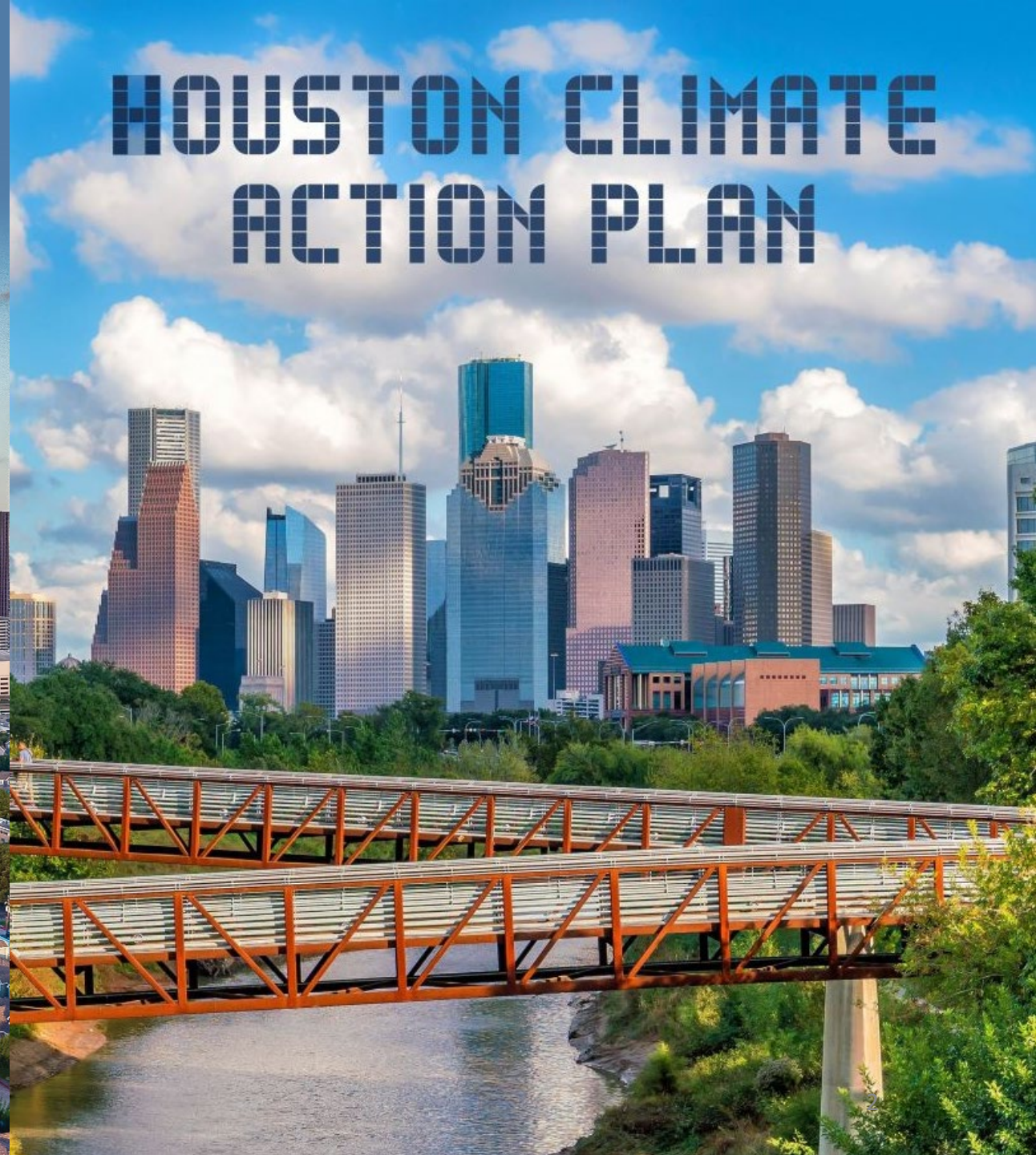
## TTI Committee Presentation

August 4 2022

# RESILIENT HOUSTON

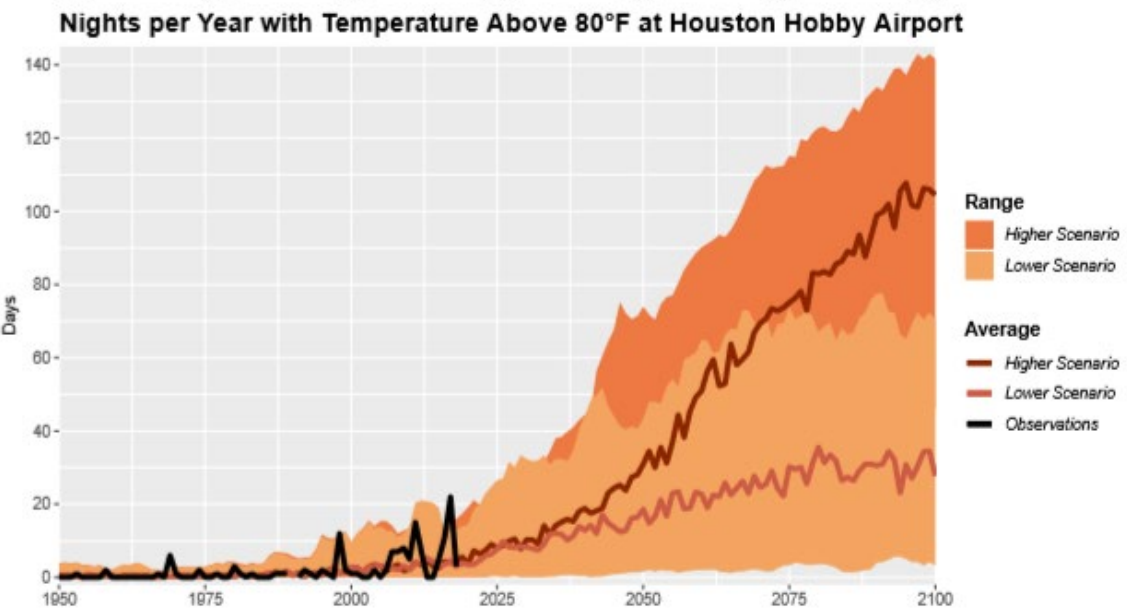
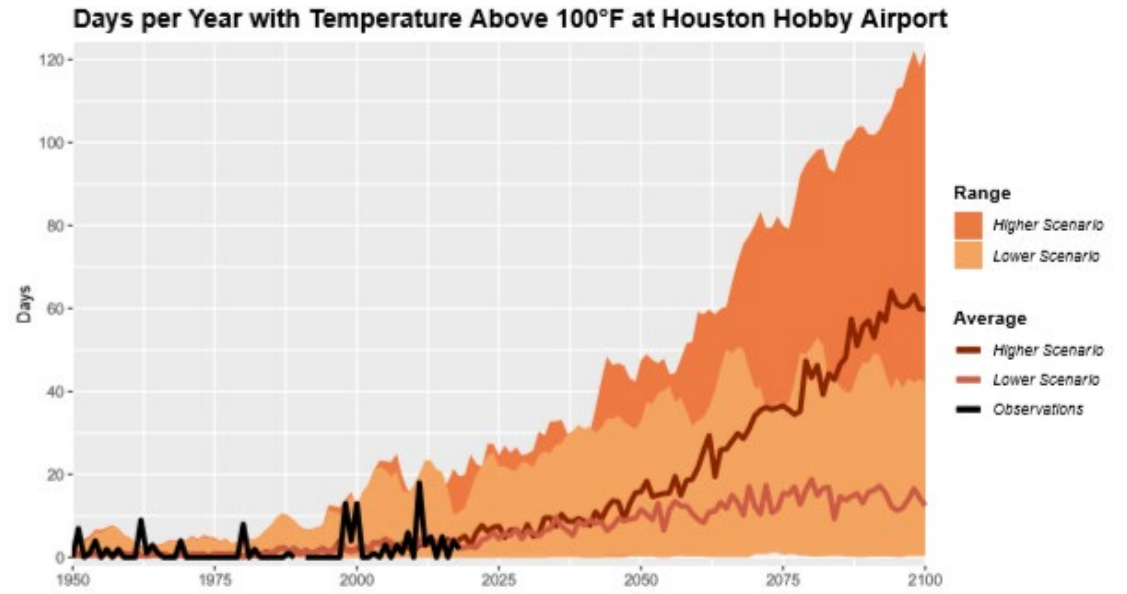


# HOUSTON CLIMATE ACTION PLAN



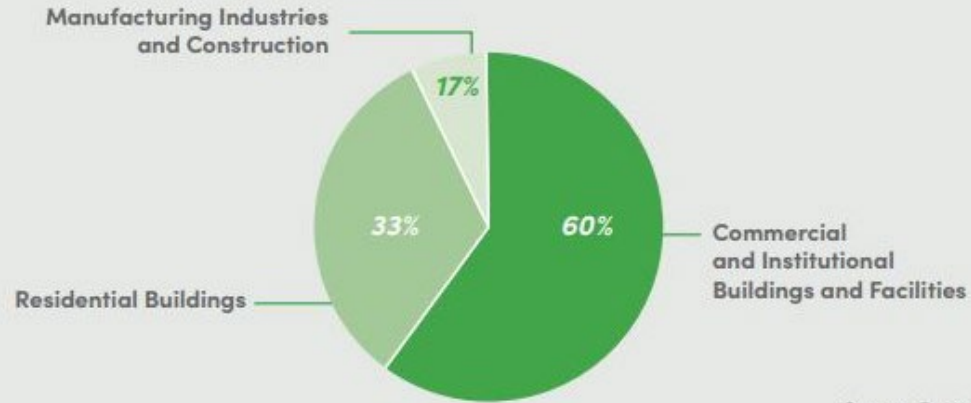


Indicator	1971-1990 (Observed)	2051-2070 (lower)	2051-2070 (higher)	2081-2100 (lower)	2081-2100 (higher)
Days per year above 100 °F	1 day (0-8 days)	12 days (0-51 days)	23 days (0-80 days)	14 days (0-53 days)	55 days (5-122 days)
Nights per year above 80 °F	<1 night (0-3 nights)	20 nights (1-73 nights)	50 nights (7-110 nights)	30 nights (1-78 nights)	95 nights (32-143 nights)
Temperature of the hottest day	99 °F (95-103 °F)	104 °F (98-112 °F)	106 °F (98-115 °F)	104 °F (98-113 °F)	109 °F (102-118 °F)
Length of the longest heatwave	2.5 days (1-5 days)	15 days (2-48 days)	27 days (3-79 days)	19 days (4-53 days)	47 days (8-111 days)
First day of summer	June 13 <sup>th</sup> (May 29 <sup>th</sup> -Jul 1 <sup>st</sup> )	May 22 <sup>nd</sup> (Apr 22 <sup>nd</sup> -Jun 19 <sup>th</sup> )	May 14 <sup>th</sup> (Apr 5 <sup>th</sup> -Jun 17 <sup>th</sup> )	May 19 <sup>th</sup> (Apr 16 <sup>th</sup> -Jun 13 <sup>th</sup> )	May 1 <sup>st</sup> (Mar 17 <sup>th</sup> -Jun 2 <sup>nd</sup> )
Last day of summer	Sept 18 <sup>th</sup> (Sept 3 <sup>rd</sup> -Oct 7 <sup>th</sup> )	Oct 7 <sup>th</sup> (Sept 14 <sup>th</sup> -Nov 3 <sup>rd</sup> )	Oct 13 <sup>th</sup> (Sept 18 <sup>th</sup> -Nov 14 <sup>th</sup> )	Oct 9 <sup>th</sup> (Sept 9 <sup>th</sup> -Nov 9 <sup>th</sup> )	Oct 26 <sup>th</sup> (Sept 30 <sup>th</sup> -Dec 2 <sup>nd</sup> )
Length of summer	97 days (70-119 days)	137 days (97-177 days)	152 days (107-206 days)	144 days (105-189 days)	177 days (137-240 days)
March to November cooling degree-days (CDDs)	3050 CDDs (2475-3575 CDDs)	3925 CDDs (2875-4950 CDDs)	4300 CDDs (3250-5600 CDDs)	4075 CDDs (3125-5175 CDDs)	4975 CDDs (3400-6300 CDDs)
Annual heating degree-days (HDDs)	1350 HDDs (1000-1975 HDDs)	950 HDDs (550-1400 HDDs)	825 HDDs (375-1450 HDDs)	900 HDDs (450-1450 HDDs)	600 HDDs (200-1150 HDDs)
Total annual precipitation	51 inches (27-83 inches)	50 inches* (18-92 inches)	49 inches* (21-106 inches)	50 inches* (19-92 inches)	48 inches* (15-105 inches)
Annual number of dry days	266 days (251-289 days)	271 days (221-311 days)	273 days (225-311 days)	270 days (227-309 days)	277 days (233-316 days)
Average wettest 3-day precipitation event	Observed: 6.4 inches <sup>†</sup> (2.1-12.4 inches) Simulated: 7.8 inches <sup>†</sup> (3.1-21.1 inches)	8.6 inches <sup>†</sup> (2.5-26.8 inches)	8.6 inches <sup>†</sup> (2.7-34.2 inches)	8.6 inches <sup>†</sup> (2.8-25.2 inches)	9 inches <sup>†</sup> (2.8-32.1 inches)
Total 20-year precipitation events above 4 inches	19 events (0-100 events)	22 events <sup>§</sup> (0-88 events)	21 events <sup>§</sup> (0-112 events)	23 events <sup>§</sup> (0-92 events)	23 events <sup>§</sup> (0-100 events)



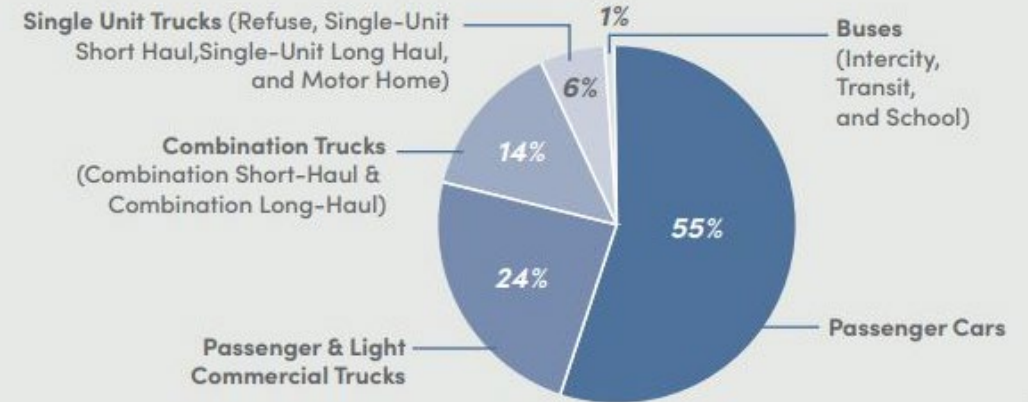
# Houston's GHG Emissions

## ENERGY USE BY SECTOR (ELECTRICITY + NATURAL GAS), 2014



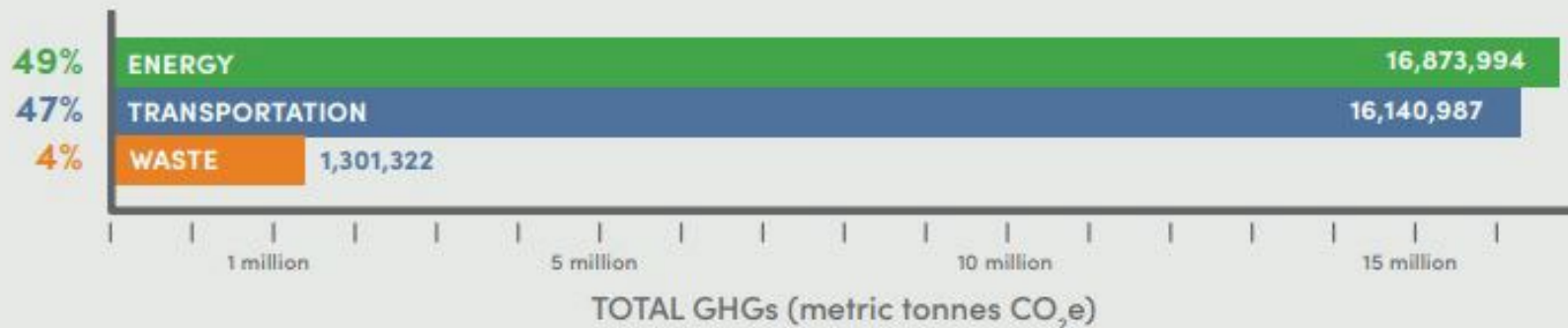
Source: CenterPoint Energy

## PERCENTAGE OF ON-ROAD TRANSPORTATION GHG EMISSIONS BY VEHICLE TYPE

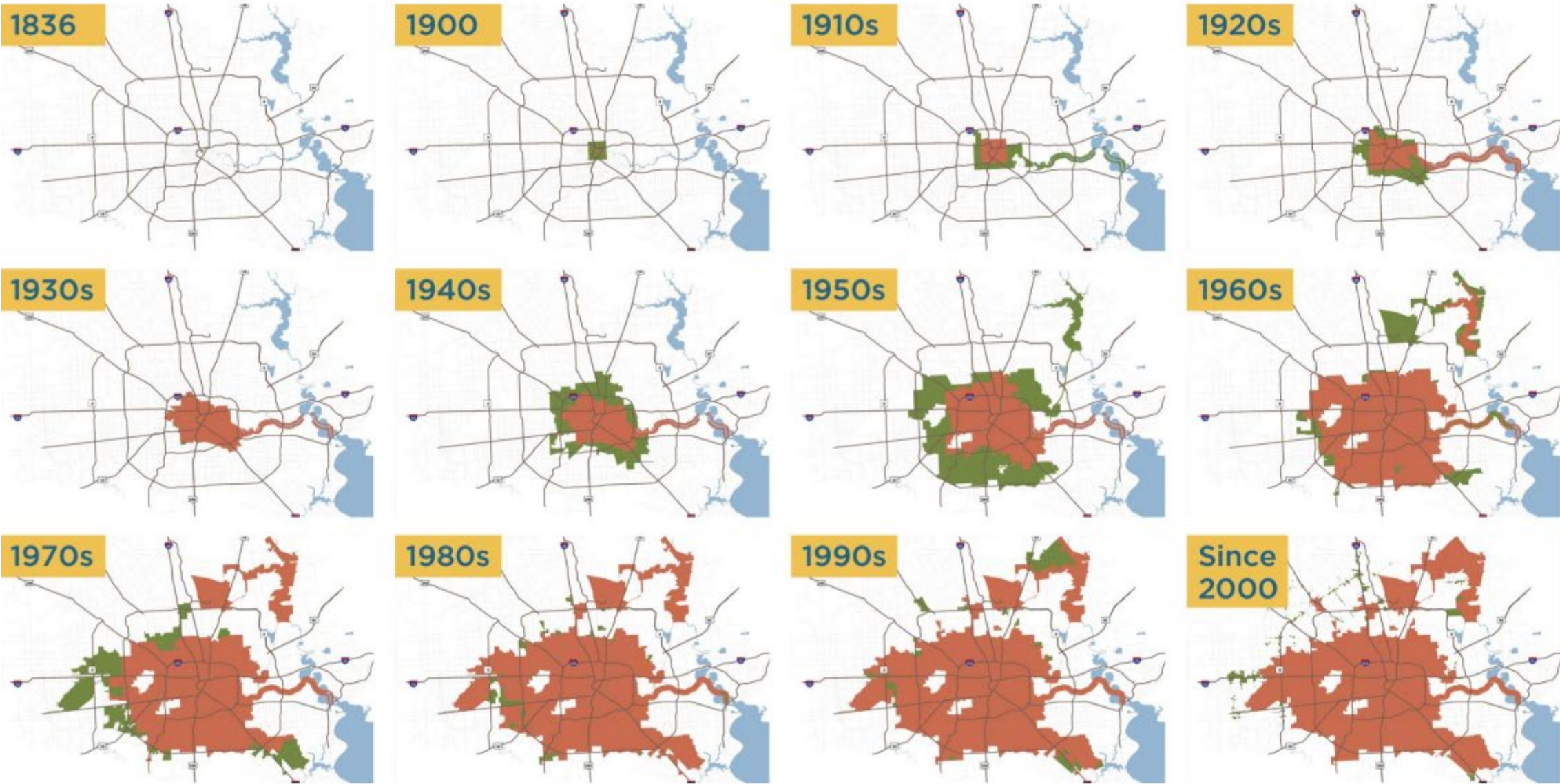


Source: H-GAC

## GHG EMISSIONS SOURCE (BY SECTOR)



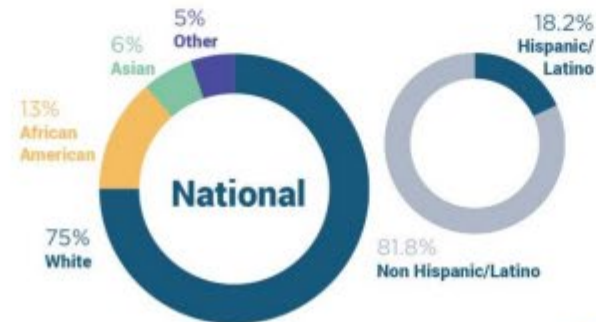
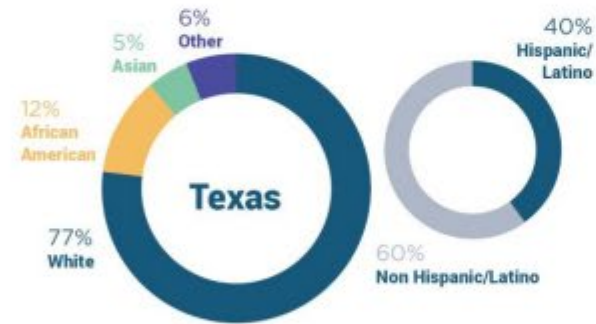
# HOUSTON HAS GROWN TO 667 SQUARE MILES IN 175 YEARS



Source: City of Houston Planning & Development Department

# A MULTICULTURAL METROPOLIS

One in four  
Houstonians  
were born  
outside of the  
United States.



145

Languages spoken  
in Houston.

3<sup>rd</sup>  
in the Nation  
after NYC & LA  
for languages  
spoken\*

More than

one  
third

of Houstonians over 5 years old speak a  
language other than English at home \*

## Foreign Born

59%  
In the Gulfton  
Community



29%  
Overall in Houston\*\*



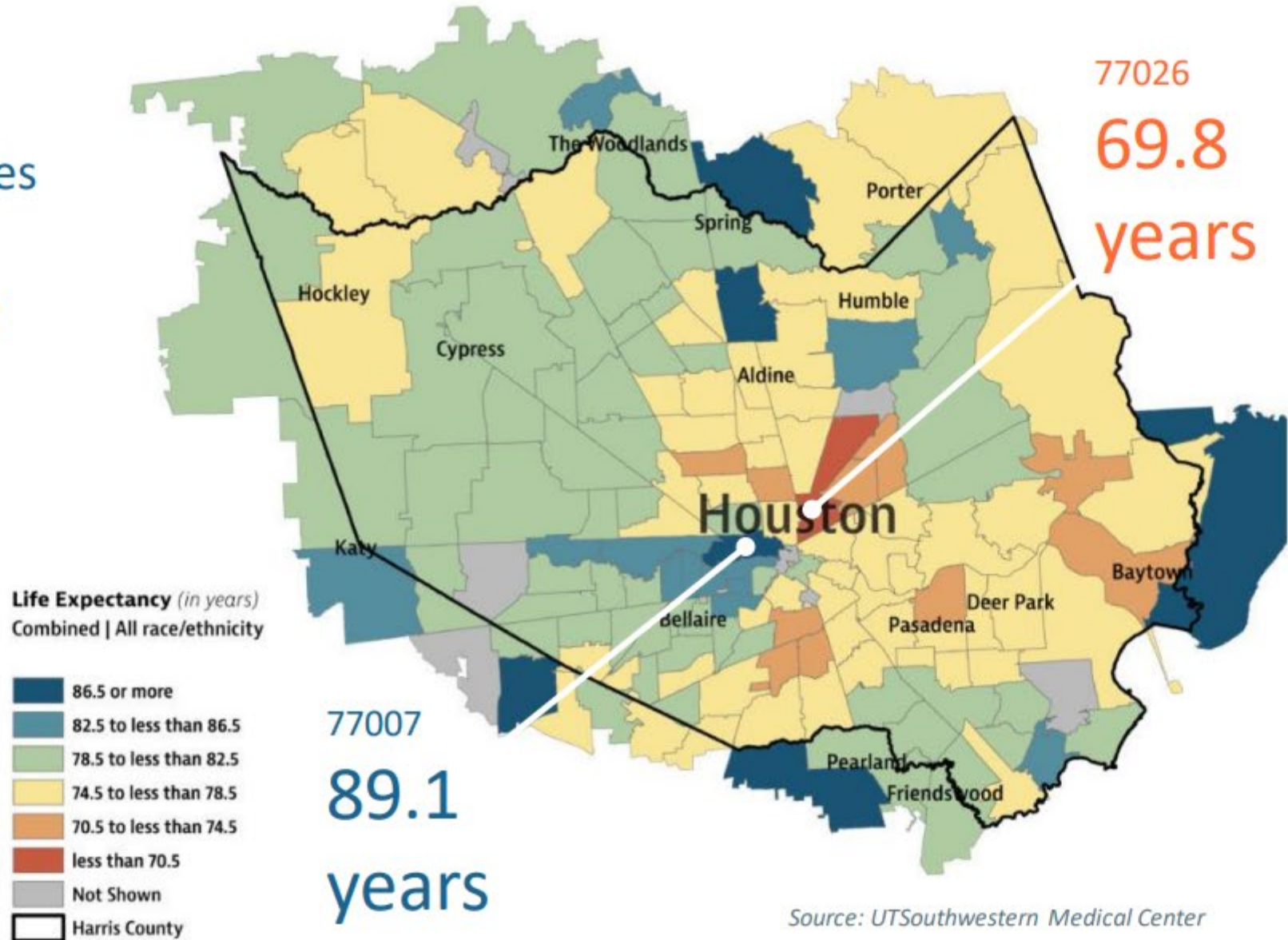
Source: U.S. Census Bureau. Hispanic or Latino Origin by Race. 2013-2017 American Community Survey 5-Year Estimates

\*Source: Visit Houston. About Houston, Facts and Figures. Accessed March 20, 2019. <https://www.visithoustontexas.com/about-houston/facts-and-figures/>

\*\* City of Houston. Gulfton, Complete Community Data Snapshot. [http://www.houstontx.gov/completecommunities/docs\\_pdfs/Gulfton/Gulfton-DataSnapshot.pdf](http://www.houstontx.gov/completecommunities/docs_pdfs/Gulfton/Gulfton-DataSnapshot.pdf)

# DISPARITIES IN QUALITY OF LIFE

Life expectancy varies by as much as **20 years** between zip codes.



# TAKING ACTION ON CLIMATE CHANGE: MITIGATION & ADAPTATION

Coordinating efforts strengthens the relationship between **climate mitigation**, through greenhouse gas (GHG) reduction and carbon neutrality in accordance with the Paris Agreement, and **climate adaptation**, which addresses the effects of a changing climate that we are experiencing today. These effects include **increased precipitation and flooding, larger, slower hurricanes, and higher heat days**. Addressing both adaptation and mitigation is critical for Houston's future.

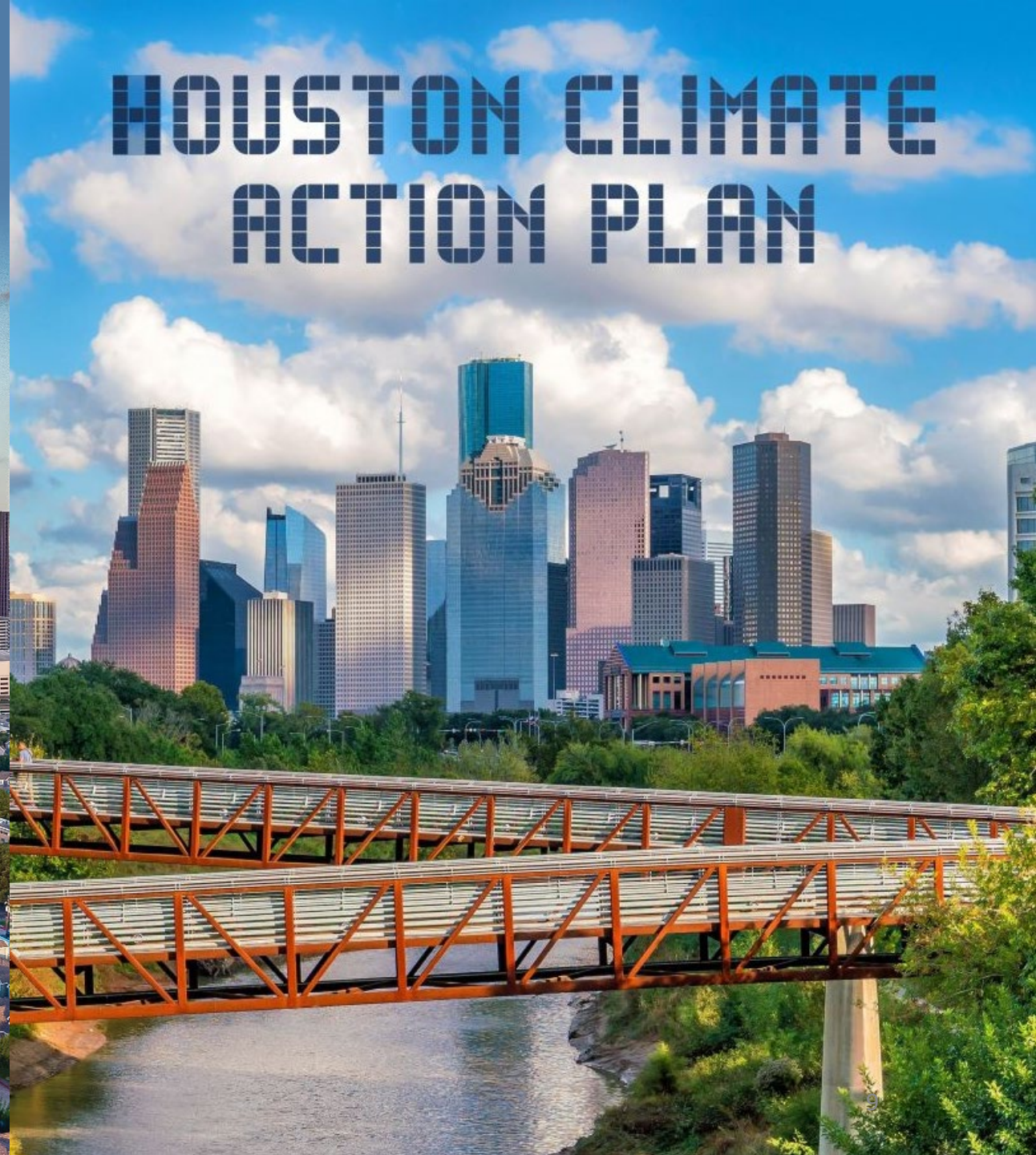




# RESILIENT HOUSTON



# HOUSTON CLIMATE ACTION PLAN



# The Resilience & Sustainability Program

## Key emphasis areas

- Mayoral Leadership – *Climate Mayors, Resilient Cities Network, C40*
- Plan Implementation
  - Projects, Programs and Partnerships
  - Strategic Implementation Workplan – project development
- Stakeholder engagement / education/ outreach
- Funding and Grants
- Reporting & tracking



# Projects, Programs and Partnerships\*

- Sunnyside Solar Farm (2023)
- Resilient Now (2022 – Phase 1)
- C40 Velasco Site (2023-23)
- Houston Recycling Collaborative (2023)
- Urban Prairie at Reed Road - *National Fish and Wildlife Foundation*
- Lily pads Masterplan (*Community Development Block Grant – Disaster Recovery 2017*) – 2023
- Resilient Cities Network - (*North America Climate Resilience Program*) 2024
- Fleet Electrification (2030)
- Building Decarbonization (ongoing)
- MOU Netherlands (2022)

\* *Not an exhaustive list*



# Implementation work package - *sample*

**EXAMPLE**

Benchmarking Program for Houston begins with Decarbonization Policy

- B1.2.1 Adopt a municipal benchmarking and disclosure policy for municipal buildings by 2021.

Now

- B1.2.2 Develop benchmarking and audit programs for commercial, industrial, and residential buildings.

2030

Wrap into Adoption of 2021 Building Code

- **36.1 *Comprehensively review and update current building codes***
- 36.2 Adopt a minimum five-year update frequency for building codes
- B1.1.1 Increase capacity and training for plan review and code inspection staff.
- B1.1.2 Evaluate, improve, and update municipal code enforcement procedures.
- B1.1.3 Accelerate energy code adoption.
- E1.1.3 Develop and enforce standards to accommodate solar and battery installation in new commercial and industrial buildings.
- T1.1.2 Adopt EV-ready building codes and streamline permitting for EV charging.

2025  
Actions

Weatherization

- B2.2.1 Promote weatherization programs to reduce residential energy consumption and focus on reducing energy burden of low-income populations.

2025



# Implementation Workplan - sample

**EXAMPLE**

Water Program and HPW

DRAFT WATER PROGRAM AREA (May182022)				Target Year	Implementation momentum	Equitable Allocation
Sub program area (DRAFT)	HPW Lead	Sub Action Title	Notes	Target Year	Implementation momentum	Equitable Allocation
Demand Reduction	Houston Water	B1.3.2 Consider water rates that encourage water conservation.	Cost of Service Study was final approved in 2021; working on Affordability Study with Alliance for Water Efficiency to be completed September 2022	2030		
		B1.3.3 Implement technologies and programs to reduce water loss and waste.	Water Planning- Internal Water Loss Task Force; Implementing a framework..assessment phase. Second year began in March 2022; MOU with Denmark to pilot tech; There should be other notes from Customer Account Services and DWO; There also is a replacement program with a annual goal/budget of 2% pipe rehabilitation (life cycle replacement) part of CIP. AMI Smart Meters implemented	2030	1	
		B1.3.4 Implement water reuse strategies to use non-potable water where appropriate.	More suitable to action 33.1; Rain Barrell Sales; Houston Water activities include amending permitted reuse rights to make those more accessible to customers (reviewed by TCEQ). Water Reuse Association; Coordinating with peer govt entites to match right water with right use. Will go to the One Water plan.	2030	1	
		33.3 Implement the City's Water Conservation Plan and Drought Contingency Plan	Paula is the point. Last update 2019; Next update is June 2024 (will hire consultant and do RFP next year); Drought plan is nested within the Water Conservation Plan; funded enterprise fund	2030		
		B1.3.1 Implement water conservation education campaigns.	(blank)	2030		1
GSI	Transportation & Drainage Operations	25.2 Hold water where it falls, before it enters the bayou	HCD funding the removal of several developments within the floodway and floodplain in its buyout program; HPW- Transportation & Drainage Operations collaborates with HCFCD on Partnership Drainage Improvement Projects that impact bayou corridors (HCFCD) and local drainage systems (COH)	2030	1	1
		26.3 Promote natural infiltration and treatment of stormwater by wetlands, prairies, and woodlands	Parks: we are currently doing this; TDO: Likely combined effort between Parks and HPW. Parks focused on parks, open green spaces, while HPW through CIPs incorporates green spaces, green stormwater infrastructure in applicable projects.	2050	1	1
		34.2 Build capacity for the design, construction, and maintenance of green stormwater infrastructure	Correct under HPW in addition to Parks: CIPs and rehabilitation transportation & drainage projects incorporating green stormwater infrastructure.	2030		1
		25.3 Expand the detention capacity of bayou corridors	HCD funding the removal of several developments within the floodway and floodplain in its buyout program; HPW- Transportation & Drainage Operations collaborates with HCFCD on Partnership Drainage Improvement Projects that impact bayou corridors (HCFCD) and local drainage systems (COH)	2030	1	1
		34.1 Advance comprehensive construction and maintenance of green stormwater infrastructure	Parks: Parks could hold some of these demonstration projects. We have a large bioswale coming to one of our parks and we have examples of the pervious pavement. We would be happy to be involved with HPW on coming up with maintenance strategies. We have some information documented on local species that do well in bioswales and maintenance requirements. Correct under HPW in addition to Parks: CIPs and rehabilitation transportation & drainage projects incorporating green stormwater infrastructure.	2030	1	1
Operational Efficiencies and Improvements	Houston Water	26.1 Prioritize challenges with wastewater discharges	Houston Water Planning /Wastewater Operations	2050	1	1
	Houston Permitting Center	2.4 Educate Houstonians on property maintenance	HPC: HPW adopted the 2015 Property Maintenance Code	2025		1
	Transportation & Drainage Operations	27.3 Evaluate and pilot smart city technologies to manage and monitor stormwater and flooding	Correct under HPW: Transportation & Drainage Operations has initiative: - Stormwater Flood Level Measurement & Analytics (Xylem, partnership w/Houston Water) implementation through stormwater master plan	2025		1
		27.1 Study water system choke points to remove obstructions that impede water flow	Correct under HPW: assuming this refers to stormwater (not drinking or waste water), Transportation & Drainage Operations conducts maintenance and rehabilitation on the existing drainage systems removing "obstructions". The upcoming (2 years approx.) stormwater master plan will produce a 2-D model of the City's drainage system, not necessarily show detailed conditions or "obstructions".	2025		
		38.2 Streamline asset management between the City and Harris County Flood Control District to improve drainage maintenance	Correct under HPW: Transportation & Drainage Operations has program in place: -City of Houston & Harris County Flood Control District Asset Exchange Program	2030		1
		38.3 Partner to enhance maintenance capacity of neighborhood assets	HPW - no known initiative ongoing.	2030		1
Combined HPW Efforts	38.1 Conduct an accurate asset inventory and evaluate maintenance cycles	HPW: Houston Water and Transportation & Drainage Ops. In TDO/Stormwater Ops: stormwater master plan will assist with evaluating current maintenance practices, in addition to continuous reassessment efforts in this area. HPC: Likely to be enhanced with Decarbonization Policy requiring benchmarking for energy and	2030		1	

# Projects, Programs and Partnerships 2022-2023

- Heat – comprehensive heat strategy
- Weatherization – holistic weatherization (partnership with HARC – Houston Advanced Research Center)
- Land Use/ Mobility – coordination with METRO, Air Alliance
- Green Stormwater Infrastructure
- Hydrogen Hubs/ Carbon Capture & Storage (CCS)
- Community Solar adoption
- IJA Funding opportunities
- *Others*

The screenshot displays the H3AT website interface. At the top, a yellow banner reads "2020 H3AT mapping results are in!" with a "Learn more" button. Below this is the navigation bar with the logo, "www.H3AT.org", and links for "Home", "About Campaign", "Why Houston's Hot", "News", "Get Involved", and "En Español". The main heading is "VIEW OUR H3AT MAPPING RESULTS". A sub-heading states: "The story map below details the volunteer efforts and results of Houston and Harris County's urban heat island mapping campaign conducted in August 2020." The central image is a heatmap titled "H3AT: 2020 Heat Mapping" with a "FLIR" logo on the right. To the left of the heatmap is a photograph of the Houston skyline at night with the text "HOUSTON INCENTIVES FOR GREEN DEVELOPMENT". On the right side of the heatmap, a vertical list of climate impacts is shown, each with an icon: Rainfall flooding/localized & riverine flooding, Hurricanes, Storm surge, Extreme temperature & Drought, Land use and urban sprawl, Environmental degradation, and Water quality. In the bottom right corner, there is a circular logo for the "HOUSTON CLIMATE ACTION PLAN".

# Stakeholder engagement

**Departmental coordination** (supporting Resilient Houston and CAP implementation)

*Houston Public Works, Planning Department, Parks, Housing, Government Relations, Mayor's Office of Complete Communities, Mayor's Office of Education*

**External agency engagement**

Centerpoint, METRO, Harris County Flood Control, TxDOT (Texas Department of Transportation), National League of Cities

**Engaging community partners**

Houston Community College (HCC), University of Houston, Rice University, Air Alliance, CEER, Super neighborhoods, Management Districts, Urban Land Institute

**Engaging private sector**

**Continuing engagement** (contractually and through partnerships)



# RESILIENT HOUSTON

# HOUSTON CLIMATE ACTION PLAN

## Questions