PRIORITY CLIMATE ACTION PLAN

Houston-Galveston Area Council

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Disclaimer

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Acknowledgements

The H-GAC Transportation Department would like to express our sincere gratitude for the invaluable contributions from the community and stakeholders to the development of this Priority Climate Action Plan (PCAP). Their engagement, insights, and comments have been pivotal in shaping a plan that reflects the needs and aspirations of our diverse community. We would also like to show appreciation to our esteemed partners at the City of Houston, Harris County, Fort Bend County, and the Houston Advanced Research Center (HARC). Your commitment, expertise, and collaborative spirit have been instrumental to the successful development of the PCAP.

As we move forward, let us continue to build upon the strong foundation laid by our affiliation. We look forward to our continued partnership and success.

EXECUTIVE SUMMARY

Background
The 2022 Inflation Reduction Act allocated $5 billion to states, territories, and regions to develop and implement plans for reducing greenhouse gas emissions. This effort was launched on March 1, 2023, when the Environmental Protection Agency introduced the Climate Pollution Reduction Grants (CGRP) Program. This program aims to cut greenhouse gas emissions, create jobs, improve air quality, and reduce energy costs.

In its initial phase, the program awarded $250 million in non-competitive grants to states and the 60 largest metropolitan regions. The Houston-Galveston Area Council (H-GAC) submitted and received approval of a grant request. This funding will support the development of a climate action plan. The resulting plan will propose measures to reduce regional greenhouse gas emissions and air pollutants, create jobs, and identify economic opportunities. It will also position the H-GAC region to compete for $4.6 billion in implementation grants.

H-GAC is collaborating with Fort Bend County, Harris County, City of Houston, and the Houston Advanced Research Center to leverage existing efforts and receive technical assistance.

PCAP Engagement
H-GAC prioritizes community engagement throughout the CPRG process, seeking proactive input for the PCAP. Strategies include website polls and surveys, a call-for-projects, hybrid public meetings, and regular sessions with municipal partners and industry stakeholders. A dedicated webpage informs the public about CPRG efforts, with over 500 unique visitors in the four months prior to this writing. The webpage includes tools for quick polls and in-depth surveys, revealing significant interest in transportation and waste sectors. A call-for-projects garnered 37 submissions, indicating community interest and existing planning efforts. A hybrid public meeting attracted 77 attendees, demonstrating the effectiveness of virtual participation. H-GAC also conducted formal presentations for various stakeholders and holds regular meetings with regional government partners.

PCAP Strategies Overview

The PCAP outlines a comprehensive strategy across various sectors to promote sustainability and reduce greenhouse gas emissions:

Buildings:

- Foster partnerships to improve building efficiency through rating, monitoring, and collaboration with stakeholders.
- Support small, minority, and women-owned businesses in adopting energy efficiency solutions.
- Provide financial support to municipalities for weatherizing public buildings.
- Collaborate with municipal stakeholders to adopt the latest building or energy codes.

Energy:

- Provide funding for municipalities to integrate solar and energy storage on public property.
- Work with partners to incentivize and promote demand-side management to reduce peak energy demand.
- Finance projects at port facilities and industrial locations to support the shift from fossil fuels to low-carbon energy sources.

Transportation:

- Provide incentives to regional small businesses for commute reduction programs to support alternatives to driving alone.
- Invest in partnerships to encourage van pools, vehicle sharing, and other micro transit options for rural and disadvantaged communities.
- Allocate resources to increase adoption of low and zero-emission vehicles and efficient fuels, along with installing EV charging infrastructure in low-income areas.
- Collaborate with stakeholders to improve bike and pedestrian infrastructure and incentivize multimodal improvements in capital construction projects.

Agriculture (Urban):

- Promote the use of native landscaping and restore degraded lands to increase carbon storage.
- Work with municipal partners to protect and enhance greenspace and expand urban tree planting programs.

Materials Management (Waste):

- Promote recycling, composting, and voluntary waste reduction programs to decrease landfill waste.

GHG Inventory

The Houston Advanced Research Center (HARC), in collaboration with H-GAC and ICLEI, established a local partial baseline inventory of greenhouse gas (GHG) emissions for the thirteen counties in the H-GAC service area using 2021 data. The inventory combined existing datasets to estimate emissions from various sectors and facilities. In 2021, the region emitted approximately 232,724,725 metric tons (MTCO2) of carbon dioxide equivalents (CO2e), with stationary fuel combustion accounting for 84%, electric power consumption for 17%, and transportation for 13% of emissions. Per capita emissions for the region in 2021 were 31.5 MTCO2.

Low-Income and Disadvantaged Communities Benefits Analysis

The PCAP prioritizes GHG reduction strategies focusing on buildings, energy, transportation, and materials management sectors, along with nature-based solutions for carbon capture. These strategies often benefit communities identified as Low-Income and Disadvantaged Communities (LIDAC). While some projects directly impact the LIDAC community by being located within strategic census tracts, regional initiatives, like incentives for reducing vehicle miles traveled, offer indirect benefits by mitigating air and noise pollution from roadways.

Next Steps

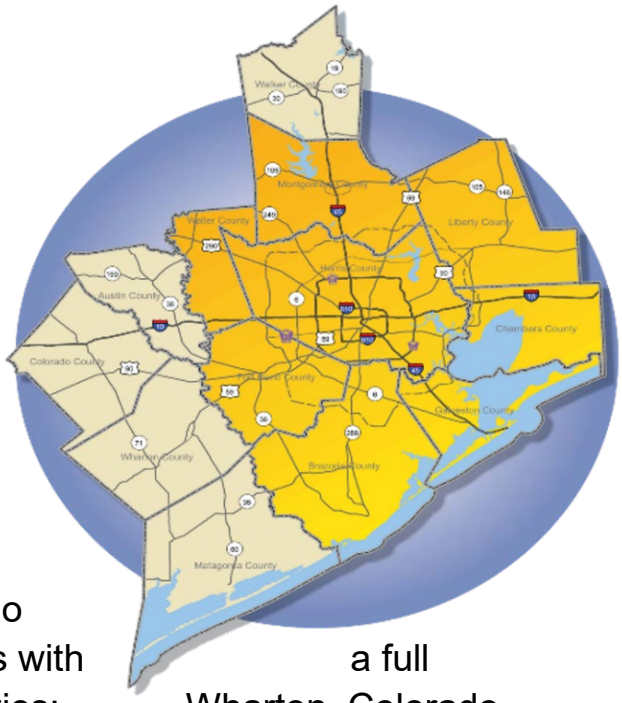
H-GAC's CPRG program is moving forward with several key next steps:

1. Meaningful Engagement: Public involvement is crucial for the CPRG effort, which includes ensuring diverse stakeholders' voices are heard and considered. H-GAC plans to enhance engagement efforts for the CCAP.

2. CPRG Implementation Grant: The PCAP positions H-GAC to compete for $4.6 billion for Implementation Grants. Applications for implementation awards are due by April 1, 2024.

3. CPRG Deliverable #2: Comprehensive Climate Action Plan (CCAP), due 2025. It will address all significant greenhouse gas sources and sectors in H-GAC's metropolitan service area.

1.0 Introduction



The Houston-The Woodlands-Sugarland Metropolitan Statistical Area (MSA) stands as the fifth largest MSA in the United States, encompassing nine counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller. These counties are serviced by the Houston-Galveston Area Council (H-GAC) as a metropolitan planning organization. H-GAC also serves as the regional Council of Governments with a full service area that includes four additional counties: Wharton, Colorado, Matagorda, and Walker. Over the past decades, this dynamic region has witnessed remarkable economic and population growth attributed, in part, to its thriving energy production, petrochemical industry, and trade activity at Port Houston. However, this rapid expansion has also led to increased regional emissions, resulting in the designation of the area as non-attainment for the ozone National Ambient Air Quality Standard (NAAQS), as well as concerning levels of fine particulate matter and other hazardous air pollutants. Moreover, recent natural disasters and severe weather events have raised concerns about escalating greenhouse gas (GHG) emissions.

To address these challenges, our region has embarked on a climate-related initiative offered by the Environmental Protection Agency (EPA), the Climate Pollution Reduction Grant (CPRG) program. Spearheaded regionally by H-GAC, in collaboration with sub-awardee partners including the City of Houston, Fort Bend County, Harris County and the Houston Advanced Research Center (HARC), this endeavor builds on the success of previous climate planning efforts like the Houston Climate Action Plan, Houston’s Resilience Strategy, Harris County Municipal Climate Plan and Climate Justice Efforts. We will engage stakeholders and communities across H-GAC's thirteen-county service area. The coalition is targeting meaningful participation and inclusion of those communities that experience climate-related effects at disproportionate rates.

The project's deliverables will be meticulously coordinated between H-GAC and the sub-awardee local governments. Each partner will assume responsibility for specific deliverables and engage stakeholders within their respective jurisdictions. For areas not covered by sub-awardee partners, H-GAC will lead the effort to collaborate with project partners to include their contributions into project deliverables: an inclusive regional Priority Climate Action Plan (PCAP), a Comprehensive Climate Action Plan (CCAP), and a final Status Report. To ensure accuracy and relevance, these documents will integrate input from project partners and regional stakeholders prior to submission to the EPA.

Further details about project activities will be outlined in subsequent sections.

1.1 CPRG Overview

The Inflation Reduction Act of 2022 (IRA) provides a robust framework for addressing GHG pollution through programs such as the CPRG program. The EPA, in executing these initiatives, aims to achieve three primary objectives:

1. Mitigate climate pollution while fostering job creation and reducing energy costs for households.
2. Expedite efforts to rectify environmental injustices and empower community-driven solutions in underserved areas.
3. Enhance air quality by curtailing harmful pollutants in areas where people reside, work, and engage in daily activities.

The CPRG program presents a unique opportunity to thoughtfully leverage vital climate change actions into catalysts for revitalizing the energy and manufacturing sectors, generating quality jobs nationwide, and addressing longstanding environmental disparities. Through collaborative efforts with states and local governments, the CPRG program seeks to identify and capitalize on GHG reduction measures which are tailored to the unique needs and potential of each area.

To this end, the EPA is taking a two-pronged approach. By facilitating the formulation or expansion of state and local climate action plans, and funding investment-ready, near-term policies, programs, and projects that demonstrate

significant, reliable GHG reductions, CPRG helps plan for the future and works to affect immediate reductions. The CPRG program will support a range of actions at various levels to reduce GHGs and other associated air pollutants.

Section 60114 of the Inflation Reduction Act allocates $5 billion to the EPA to aid states, territories, municipalities, air pollution control agencies, tribes, and affiliated entities in devising and executing GHG reduction plans. The program comprises two interrelated phases:

1. Planning grants: $250 million is designated for eligible entities to craft GHG reduction plans.
2. Implementation grants: $4.6 billion is allocated for implementing measures derived from the GHG reduction plans developed with planning grant funding.

This plan is the part of this first phase of the CPRG program. EPA awarded a $1 million planning grant to H-GAC on September 7, 2023. This report, the Priority Climate Action Plan fulfills H-GAC's first major deliverable requirement of this award.

1.2 PCAP Overview

The initial deliverable, due on March 1, 2024, is a Priority Climate Action Plan (PCAP). This narrative report outlines near-term, high-priority, implementation-ready GHG reduction measures, along with an analysis of expected emissions reductions. This H-GAC PCAP will focus on specific sectors as a baseline and expand in the future comprehensive plan process to address all sources of GHG emissions within the service area. Key components of this PCAP include a GHG inventory, quantified reduction measures, an analysis of benefits to low-income and disadvantaged communities, and a review of implementation authority. This PCAP draws from existing climate action and sustainability focused plans in the geographic area.

The PCAP serves as a prerequisite for competing in the second phase of the CPRG program, which will competitively award $4.6 billion for implementation projects. Any implementation award application must align with and include

PCAP measures and strategies to be eligible for the grant funding. Please note, however, that the second phase measures and strategies included within this document are only as subset of all measures included within this PCAP document.

1.3 Scope of PCAP

The Priority Climate Action Plan (PCAP) development process involved close collaboration between H-GAC and sub-awardee local governments, including the City of Houston, Harris County, and Fort Bend County, with HARC assuming the role of technical lead. Engagement with other local government stakeholders across the thirteen-county service area was also initiated.

The key deliverables for the PCAP are as follows:

1. Greenhouse Gas Inventory:
    - This initial inventory will establish a baseline of GHG emissions for the thirteen-county area, primarily utilizing data from EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks by State, the US GHG Reporting Program, and the National Emissions Inventory.
    - HARC will utilize existing analyses from the City of Houston and Harris County, along with ongoing efforts by Fort Bend County, to inform and complement this inventory.
2. Quantified GHG Reduction Measures:
    - HARC will quantify reduction measures for the entire thirteen-county region, drawing upon insights from the City of Houston's Climate Action Plan and work with stakeholders to identify potential measures.
    - Collaboration with local governments, municipalities, and interest groups helped inform the identification and quantification of GHG reduction measures, with support from the ICLEI ClearPath tool to estimate emissions reductions and costs.

3. Low-Income and Disadvantaged Communities Benefits Analysis:
    - HARC will conduct an analysis that demonstrates how low-income communities within the area will benefit from the potential measures aimed at improving quality of life.
    - Existing analyses and efforts from project partners will be integrated into this regional analysis, with a focus on renewable energy, green space, and clean transportation options.
4. Review of Authority to Implement GHG Reduction Measures:
    - H-GAC will collaborate with project partners to assess the available authority to implement recommended GHG reduction measures across various levels of government, identifying gaps to establishing authority where lacking.
5. Intersection with Other Funding Availability:
    - Statewide partners and project partners, including the City of Houston, Harris County, and Fort Bend County, will explore funding opportunities aligned with the PCAP's goals, with H-GAC providing guidance and support as needed.
6. Stakeholder and Community Engagement:
    - Public engagement activities involved both independent efforts by the City of Houston, Harris County, and Fort Bend County within their respective areas, and coordinated outreach by H-GAC across the broader region.
    - A combination of in-person and virtual meetings were conducted throughout the PCAP development process to gather input from stakeholders at the county and municipal levels.
    - H-GAC facilitated engagement efforts beyond these areas, engaging regional leadership and stakeholders to expand awareness and involvement in the climate action planning process.
7. PCAP Interagency and Intergovernmental Coordination:
    - Project partners leveraged their expertise and activities to support the PCAP's goals, with H-GAC coordinating efforts across the region

and providing a centralized repository for project-related materials and drafts.

Through this collaborative approach, this PCAP aims to develop comprehensive strategies for reducing GHG emissions and advancing climate resilience across the H-GAC service area.

1.4 Engagement Highlights

H-GAC recognizes that the meaningful engagement of our region's communities is a key driver of success during the CPRG process. Throughout the development of the PCAP, H-GAC primarily sought *formative,* rather than *reactive*, feedback. Key strategies thus far include a poll and survey feature on the agency's website, an open and robust call-for-projects, a hybrid public meeting, weekly meetings with identified municipal partners, small, formal presentations about the CPRG to interested parties, and meetings with members of industry.

To encourage public participation and foster transparency, H-GAC created a dedicated webpage for the ongoing CPRG efforts. The webpage describes the grant broadly, provides details about each of the three CPRG deliverables and describes their contents, and provides contact information for the appropriate agency staff. In the four months leading to PCAP drafting, the webpage has been viewed by over 500 unique visitors, with visitors returning an average of 5 times. This data suggests that those who visit the page find it to be informative and a valuable resource. On the webpage, two tools offer the agency a "pulse-check" on community attitudes, a quick poll, and an in-depth survey. The quick poll asks about a visitor's interest/concern about each of the 6 sectors. The survey delves deeper into potential strategies for GHG reduction and asks users for feedback on each sector. The two most visited portions of the survey were for transportation and waste, water, and sustainable materials. Lastly, a call-for-projects was conducted via the agency's website that garnered 37 unique projects representing a variety of sectors and locations with the project region. Many of the submitted projects were shovel-ready plans, giving H-GAC an

indication of both community interest and institutional planning efforts around GHG reduction measures prior to phase II of the CPRG.

H-GAC hosted a hybrid public meeting on January 11th, 2024, which garnered 77 attendees. Virtual participants more than doubled those in-person (55 and 22, respectively). This data supports the usefulness of hybrid options for public participation. During the event, H-GAC staff provided an overview of the regional CPRG effort, HARC provided an overview of the technical portion of the project, and project partners were given an opportunity to discuss their individual and related efforts. Following these presentations, an hour was dedicated to a Q&A period to give community members ample time to digest the various presentations and engage with project partners. Accommodations such as ASL interpretation and Spanish translation were present. Additionally, H-GAC staff formally presented on the CPRG to 25+ small groups upon request. These groups have included industry ports, ZEV service providers, utilities, consultants, NGOs, H-GAC board, councils, workgroups, etc. Impactfully, H-GAC has convened a regular meeting with regional government partners including the City of Houston, Fort Bend County, and Harris County to discuss and strategize about the CPRG. This group assessed and helped evaluate the call-for-projects, acted as a roundtable for project brainstorming, and offered guidance on high-level planning.

In recognition of the unique climate-related challenges that affect Low-Income and Disadvantaged Communities (LIDAC) and EPA's Justice40 initiative, the equitable inclusion of LIDAC voices is paramount. Harris County is the most populous county in the Houston-The Woodlands-Sugarland MSA and lies at the center of the "energy capital of the world". It also contains the highest concentration of LIDAC communities in the region. The county is well-situated as a representative case in LIDAC engagement, ahead of robust, region-wide engagements during the CCAP. The Harris County Climate Justice Framework engaged nearly 200 participants over four in-person and one virtual meeting to "plan for planning" and learn how to best engage communities in climate initiatives.

Harris County Precinct 1 Climate Justice Stakeholder Meeting, 2023

To defray the barriers typically associated with participation in public meetings, language interpretation, transportation, childcare, and food was provided. High level concerns and feedback received included: lack of effective communication by government agencies, limited access to green space, pollution that disproportionately harms LIDAC communities, and the need to prioritize and elevate community voices in planning.

Following PCAP submittal, H-GAC is excited to amplify our meaningful engagement efforts ahead of the CCAP. We plan to contract a marketing firm to assist in the identification of meeting venues, manage advertising buys, facilitate public meetings, and develop collateral materials. We also expect to leverage social media, direct-mailing, newsletters, and email to disseminate CPRG information.

2.0 PCAP Elements

Table 1: PCAP Elements

Elements	Priority Climate Action Plan (Due March 1, 2024)	Comprehensive Climate Action Plan (Due Summer 2025)	Status Report (Due 2027)
GHG Inventory	REQUIRED	REQUIRED	ENCOURAGED
GHG Emissions Projections	NOT REQUIRED	REQUIRED	ENCOURAGED
Near-Term/Long-Term GHG Reduction Targets	NOT REQUIRED	REQUIRED	NOT REQUIRED
Quantified GHG Reduction Measures	REQUIRED	REQUIRED	REQUIRED
Benefits Analysis	ENCOURAGED	REQUIRED	REQUIRED
Low-Income and Disadvantaged Communities Benefits Analysis	REQUIRED	REQUIRED	REQUIRED
Review of Authority to Implement GHG Reduction Measures	REQUIRED	REQUIRED	REQUIRED
Intersection with Other Funding Availability	ENCOURAGED	REQUIRED	REQUIRED
Workforce Planning Analysis	ENCOURAGED	REQUIRED	REQUIRED
Next Steps/ Future Budget Needs	NOT REQUIRED	NOT REQUIRED	REQUIRED

2.1 Greenhouse Gas (GHG) Inventory

The greenhouse gas (GHG) inventory is a comprehensive accounting of the emissions of GHGs produced by our region. This inventory is an essential tool for understanding our region's contribution to climate change and for developing strategies to reduce emissions and mitigate climate impacts. Additionally, the inventory will serve as a baseline for setting emission reduction targets, tracking progress over time, and informing policy decisions related to climate action and sustainability.

2.1.1 SCOPE

HARC worked with H-GAC and ICLEI to develop a local baseline inventory of the major sources of GHG emissions for thirteen counties located within the Houston-The Woodlands-Sugarland MSA. The baseline year selected was 2021 to maximize data availability.

The PCAP GHG inventory included the following sectors and gases:

Emission Source Categories	Greenhouse Gases (across all sectors)
1. Transportation 2. Stationary Fuel 3. Grid Electricity 4. Solid Waste	carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O)

Table 2: Rationale for Sector Selection

Sector	Rationale for Including in GHG Inventory
Transportation	Transportation activities were the largest source (29 percent) of total U.S. greenhouse gas emissions in 2021. From 1990 to 2021, transportation CO_2 emissions from fossil fuel combustion across the U.S. increased by 19 percent.
Grid Electricity	The electric power sector accounted for 25 percent of total U.S. greenhouse gas emissions in 2021.
Stationary Fuel (Including for commercial and residential heating)	In 2021, the commercial and residential sectors accounted for 7% and 6% of total U.S. greenhouse gas emissions, respectively. Emissions from the commercial and residential sectors have increased since 1990. Total residential and commercial greenhouse gas emissions in 2021 have increased by 2% since 1990.
Solid waste	Landfills were the third largest source of anthropogenic methane emissions in 2021, and landfills accounted for 1.9% of total U.S. greenhouse gas emissions.

2.1.2 DATA REVIEW

The PCAP GHG inventory utilized existing datasets for sector-specific or facility-specific GHG emissions estimates, emissions factors, or activity data for use with emissions factors. Inventories were developed for each county; these individual inventories were then summed to determine the total regional inventory.

1. **Transportation**:
   - Vehicle registration data from the Texas Department of Motor Vehicles (TxDMV).
   - Federal averages of vehicle miles per gallon from the U.S. Department of Transportation Federal Highway Administration.
   - County level estimates of vehicle miles traveled by vehicle and fuel type using data from the Highway Performance Monitoring System of the Federal Highway Administration.
   - National Emissions Inventory (NEI) 2020 county-level estimates for mobile sources.
2. **Grid Electricity:**
   - U.S. Department of Energy's (DOE's) State and Local Planning for Energy (SLOPE) Platform which reports county-level electricity usage in million British thermal units.
3. **Stationary Fuel (Including for commercial and residential heating):**
   - Data published by the EPA under the Greenhouse Gas Reporting Program (GHGRP) for fossil fuel consumption using customer classes from CenterPoint Energy and EPA NEI 2020.
   - County-level natural gas consumption data from DOE's SLOPE Platform.
4. **Solid waste**:
   - Annual summaries of municipal solid waste (MSW) managed and amounts of remaining capacity in each county, reported by the Texas Commission on Environmental Quality (TCEQ).
   - Landfill emissions data reported to the EPA's GHGRP and NEI 2020.

2.1.3 GHG ACCOUNTING METHOD

ICLEI's Clear Path software's[1] community-wide (CW) track was used to complete the greenhouse gas inventories. ClearPath is a greenhouse gas inventorying tool provided by ICLEI – Local Governments for Sustainability to H-GAC as an ICLEI member community. The tool works by taking activity data (e.g., vehicle miles traveled) or usage data (e.g., gallons of diesel consumed), and uses emissions factors from national databases to calculate emissions. Table 2 summarizes key regional activity data. Fourteen separate inventories were created in ClearPath; one for each of the thirteen counties in the region, and one for the 13-county region for calendar year 2021.

[1] https://icleiusa.org/clearpath/

Table 3*:* Summary of regional activity data used to develop GHG inventories.

Source and Sector	Activity	Unit
Stationary Fuel Combustion: Natural Gas Usage		
Residential	103,419,423	MMBtu
Commercial	56,455,399	MMBtu
Industrial	723,665,940	MMBtu
Grid Electricity: Energy Equivalent Usage		
Residential	44,641,910	MMBtu
Commercial	146,953,090	MMBtu
Industrial	108,134,996	MMBtu
Transportation		
On-road (gasoline) VMT	57,207,297,264	miles
On-road (diesel) VMT	5,211,591,606	miles
Rail (diesel) Energy Equivalent Usage	4,245,592	MMBtu
Solid Waste		
Solid Waste Disposal in Landfill	9,374,832	Wet short tons

2.1.4 RESULTS

In 2021, the Houston region generated approximately 232,724,725 metric tons (or tonnes) of carbon dioxide equivalents ($MTCO_2e$). Regional per capita GHG emissions for 2021 were 31.5 $MTCO_2$. Figures 1, 2, and 3 and Tables 3, 4, and 5 summarize the 2021 Houston region inventory for the PCAP. Additional county summary tables are included in Appendix D. The three largest sources of GHG emissions in 2021 for the Houston region are stationary fuel combustion (84%), electric power consumption (grid electricity; 17%), and mobile (transportation; 13%) sources.

When comparing total GHG emissions across the thirteen counties in the region (Figure 1), Harris County represents the largest share (56%) with 130,380,125 $MTCO_2e$ in 2021. The Harris County population (4,735,287) is also 64% of the regional population. Brazoria County (population of 378,858) has the second highest total GHG emissions in the region with 28,960,955 $MTCO_2e$. Fort Bend County (21,371,188 $MTCO_2e$), Galveston County (19,258,870 $MTCO_2e$), and Chambers County (13,608,232 $MTCO_2e$) represent the third, fourth, and fifth largest GHG inventories in the region. Austin County has both the smallest population (30,421) and GHG inventory (658,262 $MTCO_2e$).

Located within Harris County, the City of Houston is the fourth largest city in the nation and the largest city in Texas. According to the City of Houston's 2020 GHG Inventory Update published in the Resilient Houston Three Year Report, Houston generated 16,256,403 $MTCO_2e$ from transportation sources and 13,079,709 $MTCO_2e$ from stationary energy sources (combined natural gas and electric power consumption across all sectors). In 2020, Houston city-wide total emissions are 30,050,613 $MTCO_2e$. Therefore, it is estimated that approximately 100,000,000 $MTCO_2e$ of the Harris County priority GHG inventory can be attributed to areas outside of the City of Houston general purpose boundary, including the extraterritorial jurisdiction and areas such as the Houston Ship Channel. As detailed in Appendix D, the largest sources of GHG emissions in Harris County in 2021 are industrial stationary fuel combustion (natural gas consumption; 59%, 76,503,088 $MTCO_2e$), on-road transportation (13%, 17,155,881 $MTCO_2e$), and commercial electric power consumption (7%, 12,389,514).

Figure 1: Total GHG Emissions by County (2021)

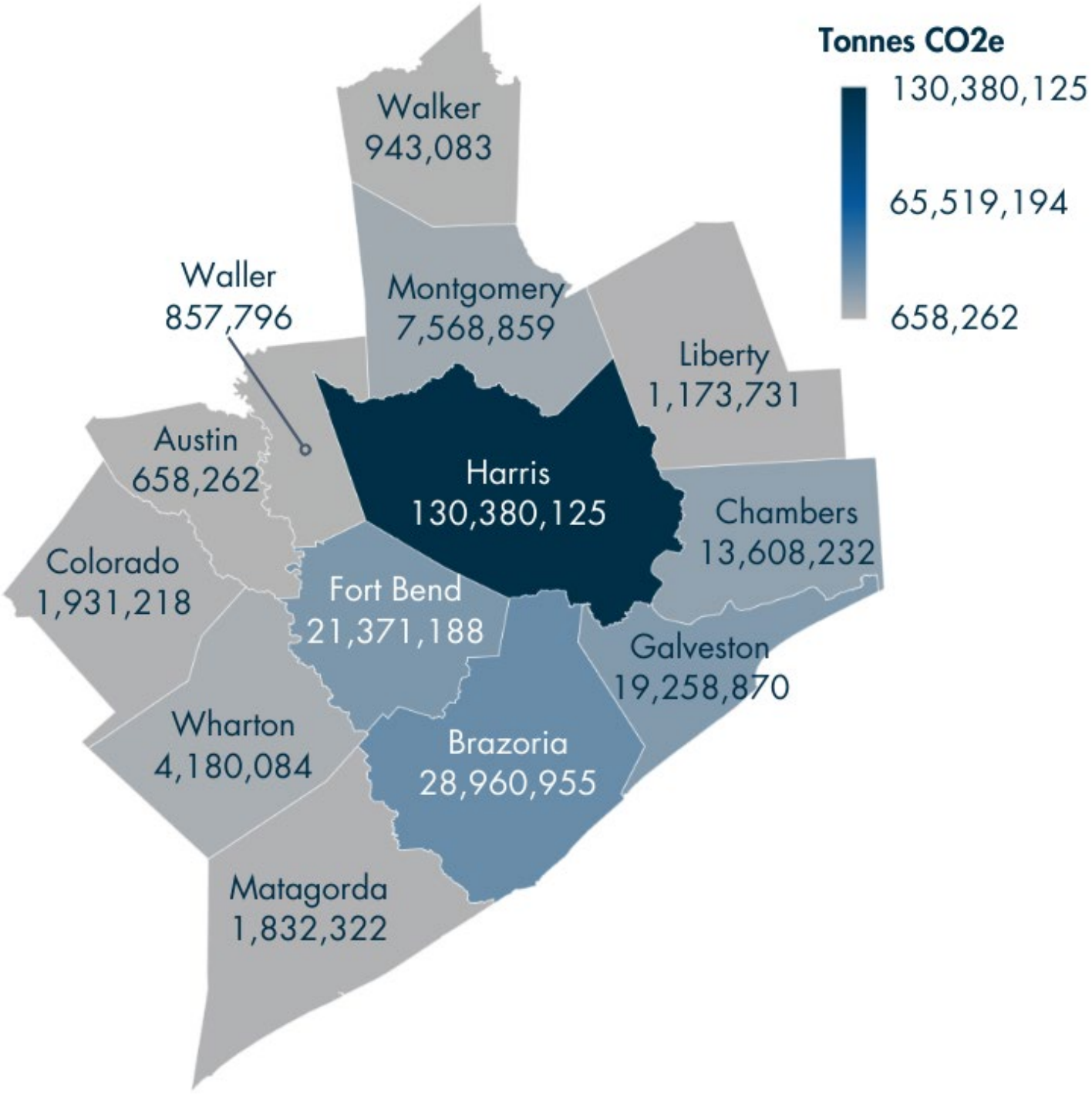


Table 4: Houston Region Priority GHG Inventory by Source (2021)

GHG Emissions by Source Category	Total GHG Emissions ($MTCO_2e$)	Percentage of Total Inventory
Stationary Fuel Combustion	196,708,943	84%
Grid Electricity	38,938,346	17%
Transportation	29,892,292	13%
Solid Waste	6,123,490	3%
Total	**232,724,725**	**100%**

Table 5: Houston Region Priority GHG Inventory by Source / Sector (2021)

GHG Emissions by Sector Category	GHG Emissions ($MTCO_2e$)	Percentage of Source
Stationary Fuel Combustion		
Residential	2,374,347	1.5%
Commercial	3,002,665	1.9%
Industrial	152,393,585	96.6%
Grid Electricity		
Residential	11,232,627	29%
Commercial	15,960,922	41%
Industrial	11,744,797	30%
Transportation		
On-road	27,901,644	93%
Railways	316,577	1%
Waterborne navigation	1,674,070	6%
Solid Waste		
Solid Waste Disposal in Landfill	6,123,490	100%

Table 6: Houston Region Priority GHG Inventory by Source and Gas (2021)

Emissions by Source, Gas	CH_4 (MT)	CO_2 (MT)	N_2O (MT)
Stationary Fuel Combustion	19,444	156,720,375	1,909
Grid Electricity	2,573	38,765,293	381
Transportation	567	29,755,317	457
Solid Waste	218,696	-	-
Total	**241,280**	**225,240,985**	**2,747**

Figure 2: Percent of Regional GHG Emissions by Major Sources (2021) [HARC]

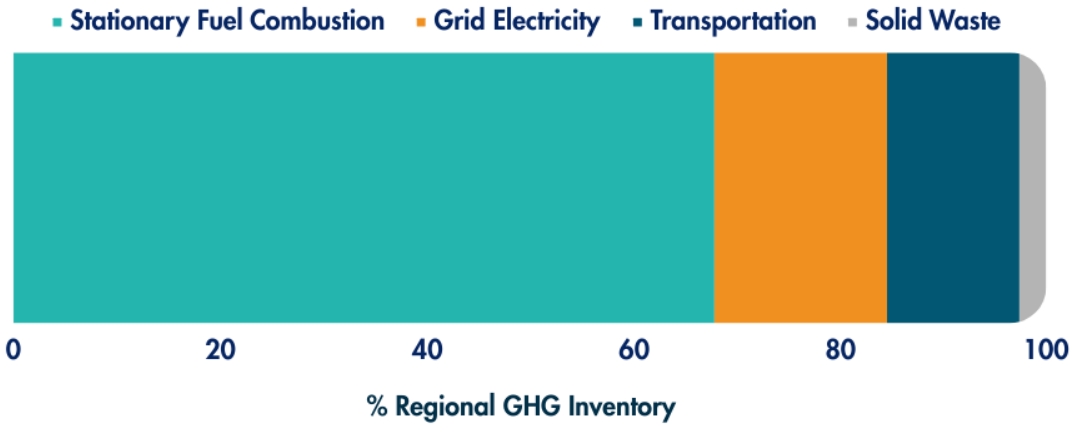


Figure 3: Percent of Regional GHG Emissions by Major Sources and Sectors (2021) [HARC]

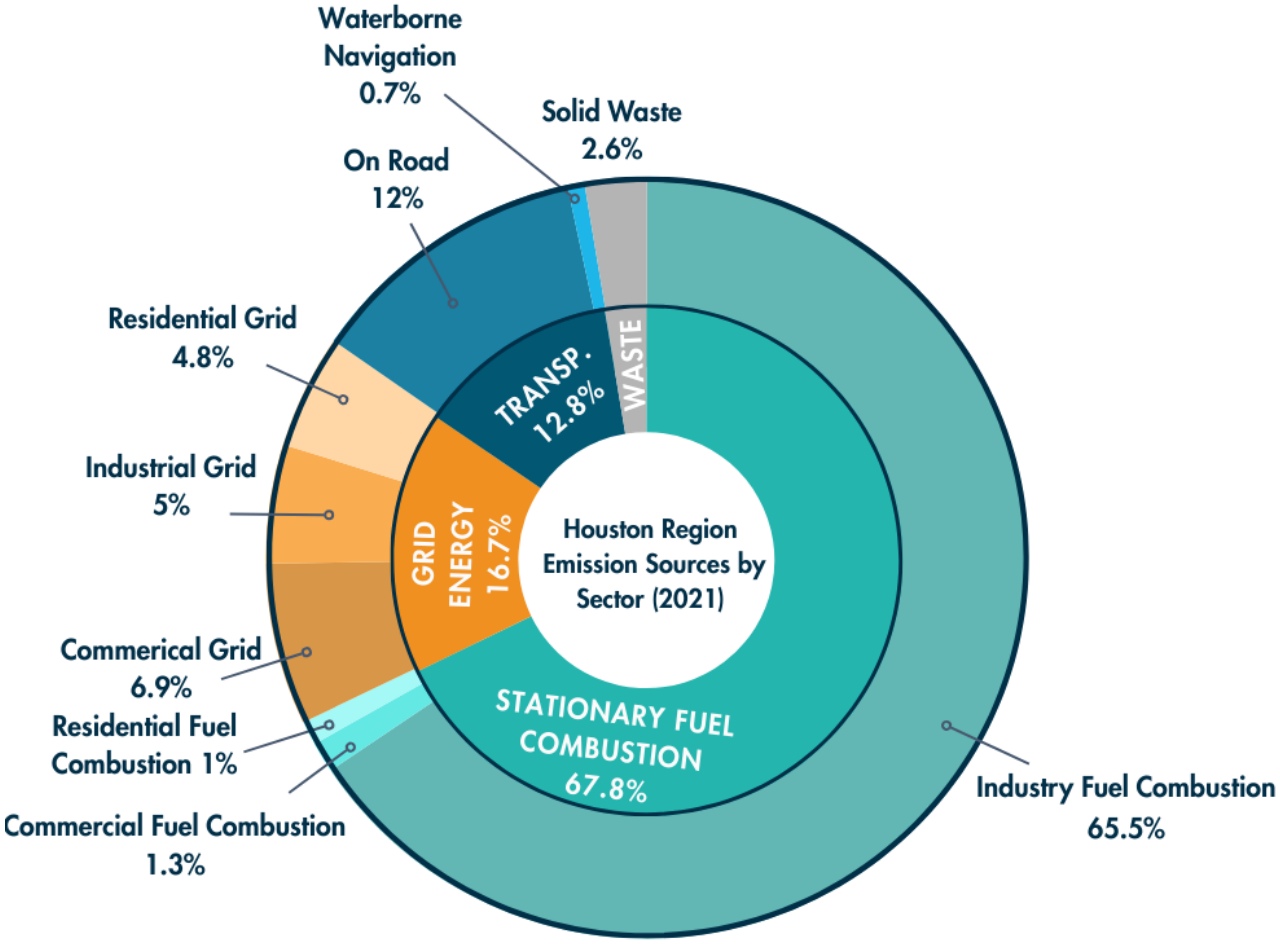
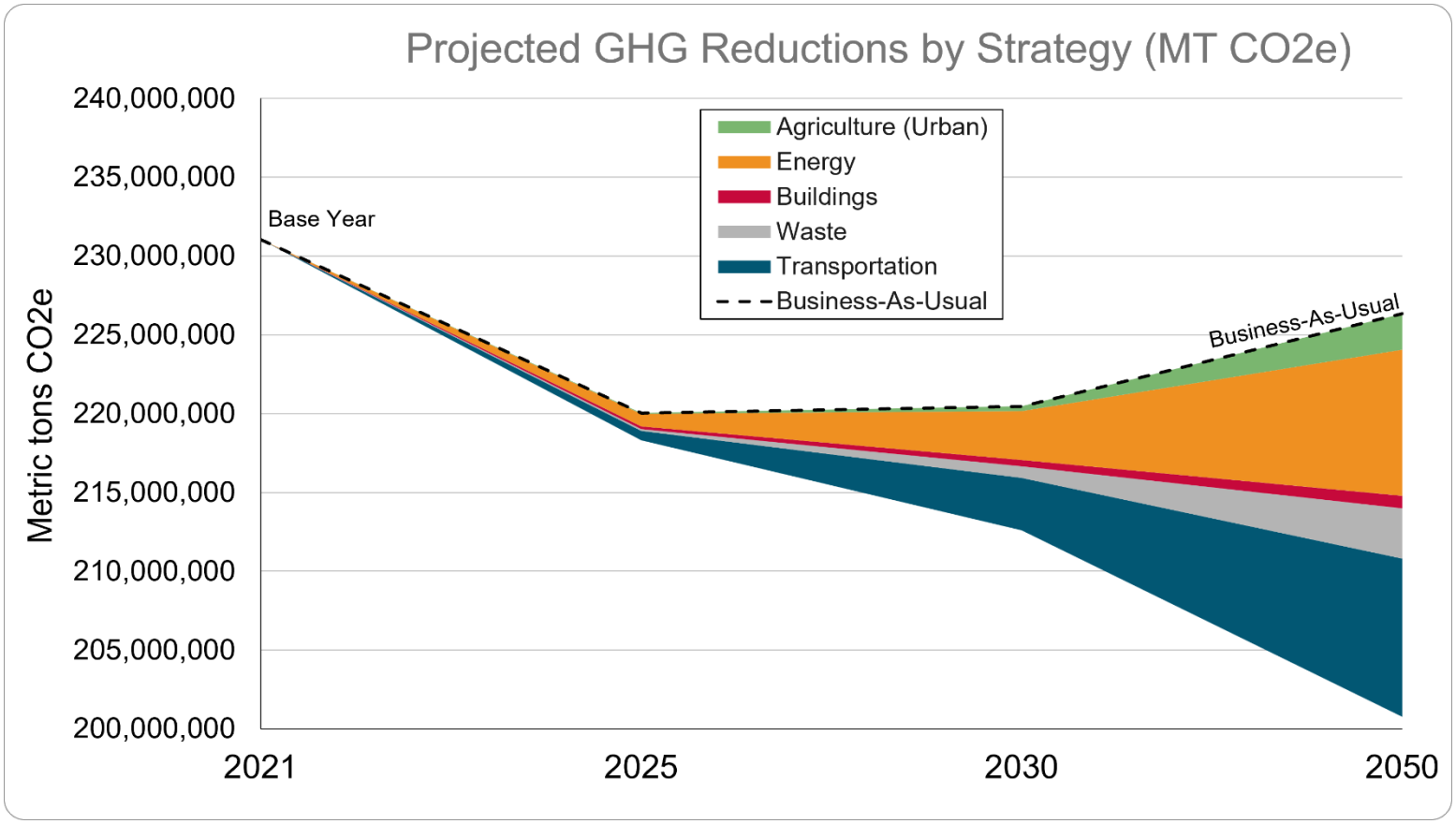


Figure 3 shows the regional 2021 GHG emissions inventory for various sectors nested within the appropriate emission source categories. The inner ring shows the proportion of emissions by source category (stationary fuel combustion, grid energy, transportation, and waste). The outer ring aligns with the inner ring to detail the percentages of emissions from different sectors in relation to a particular source category.

2.2 GHG Reduction Measures

Figure 4: GHG emissions forecast of the priority GHG reduction measures in relation to the expected business-as-usual (BAU) scenario.



Some of the assumptions that went into this analysis include growth factors for population growth, future fuel and electricity use (U.S. EIA projections through 2050), and the predicted energy composition and emissions of the electricity grid (according to ERCOT projections).

The model shows the cumulative impact of maximizing the impact of measures included in the PCAP based on the following assumptions:

- 2.5% of commercial and residential buildings receiving retrofits per year for 20 years (B1-B4).
- 760 MW solar installed in the region across 10 years (E1).

- Port electrification projects reduce 6,241,321 MMBTU of natural gas usage by 2050 (E3)
- Demand programs will curtail 6,000 kWh per facility annually. (E1)
- 30% of passenger and light duty vehicles will be converted to electric by 2030 (T3, T4).
- Employees of small businesses will reduce their VMT by 20% (T1).
- Public transit route miles will increase 10% (T2, T6).
- Two trips per day per person will be made by walking or biking (T5).
- Tree canopy will increase by 50% by 2050 (AU4)
- Forested areas will increase by 10% by 2050 (AU2, AU3).
- Estimated 2 million kWh saved per year from irrigation avoidance (AU1).
- 50% reduction in solid waste sent to landfill by 2050 (MM1).

If implemented at full scale, the modeled actions within the PCAP could achieve additional reductions of GHG emissions per year compared to the business-as-usual scenario (7,857,746 MT CO_2e in 2030 and 25,553,001 MT CO_2e in 2050, respectively).

Table 7: Houston Region Priority Measures Summary

Sector	Desired Outcome	Measure
Buildings	More Efficient and Resilient Buildings	B1: Foster partnerships with stakeholders to encourage rating, monitoring, and improved building efficiency.
		B2: Support small and minority and women owned businesses financially in efforts to incentivize energy efficiency solutions.
		B3: Provide financial support to municipal stakeholders to weatherize existing public buildings.
		B4: Work with municipal stakeholders to adopt latest building or energy codes.
Energy	Expanded Renewable Energy Integration	E1: Provide funding to municipal stakeholders to incorporate solar and energy storage on public property.
	Reduced Peak Energy Demand	E2: Work with partners to incentivize and promote demand side management.
	Advanced Decarbonization	E3: Finance projects at port facilities and industrial locations that support the shift from fossil fuels to low carbon energy sources.
Transportation	Increase Mode Shift	T1: Provide incentives to regional small businesses to incorporate commute reduction programs and promote alternatives to driving alone.
		T2: Invest in partnerships to encourage van pools and vehicle sharing for rural and disadvantaged communities.
	Increased Low and Zero Emission Vehicle Deployment	T3: Allocate resources to government and commercial fleets to increase adoption of low and zero emission vehicles and high efficiency fuels.
		T4: Provide financial assistance to stakeholders with the installation of EVSE in low-income and disadvantaged communities.
	Expand Multimodal and Active Transportation Infrastructure	T5: Collaborate with stakeholders to incorporate improvements to bike and pedestrian infrastructure and services.
		T6: Incentivize multimodal improvements in Capital construction projects.
Agriculture (Urban)	Integrate Nature-based Solutions in Urban Development	AU1: Promote the use of native drought-tolerant, low-maintenance landscaping.
	Expanded Land Restoration	AU2: Work with municipal partners to restore degraded lands to increase carbon storage.
	Enhance and Protect Greenspace	AU3: Work with municipal partners to protect and enhance greenspace to increase carbon storage.
	Increased Urban Tree Canopy	AU4: Support partners with expanding urban tree planting programs.
Materials Management (Waste)	Decreased Landfill Wasted	MM1: Work with stakeholders to promote and incentivize recycling, composting, and other voluntary waste reductions programs.

B1: Foster partnerships with stakeholders to encourage rating, monitoring, and improved building efficiency.

DESCRIPTION

This initiative focuses on ongoing monitoring and benchmarking of building energy consumption. Building owners and managers can track energy usage over time, compare it to similar buildings or industry standards, and identify opportunities for improvement. This program will promote essential sustainable building practices and reducing energy consumption.

DESIRED RESULTS

Programs provide building owners, managers, and occupants with knowledge and skills to improve building efficiency. By empowering stakeholders with information and incentives this program will help drive behavior change and promote energy-conscious decision-making.

IMPLEMENTATION FACTORS

By implementing this program, stakeholders can understand the comprehensive approaches taken to encourage energy efficiency improvements in buildings, driving sustainability and cost savings while benefiting the environment.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
MUNICIPAL AND INDUSTRY	COMPANIES PARTICIPATING

LOW- INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Job Creation
- Decreased Energy Cost
- Enhanced Resilience

Buildings Sector

ESTIMATED GHG REDUCTIONS (2030): *Cumulative for B1, B2, B3, B4*	**394,244 MTCO2e**
ESTIMATED GHG REDUCTION (2050): *Cumulative for B1, B2, B3, B4*	**794,924 MTCO2e**

B2: Support small business financially in efforts to incentivize energy efficiency solutions.

DESCRIPTION

This program aims to support small businesses in implementing energy-efficient solutions while providing financial incentives to offset upfront costs. By investing in energy-efficient solutions, small businesses can significantly reduce their energy consumption and operating costs over time.

Buildings Sector

DESIRED RESULTS

In addition to financial savings, energy efficiency measures contribute to environmental sustainability by reducing greenhouse gas emissions and mitigating the environmental impact of energy consumption.

IMPLEMENTATION FACTORS

Participating small businesses can benefit from access to valuable resources, financial incentives, and technical expertise to reduce energy costs, enhance competitiveness, and contribute to a cleaner, greener future.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
PUBLIC AND PRIVATE	PARTICIPATING COMPANIES

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Improved Air Quality
- Decreased Energy Cost
- Job Creation
- Enhanced Resilience
- Workforce Development
- Community Capacity Building

ESTIMATED GHG REDUCTIONS (2030): *Cumulative for B1, B2, B3, B4*	**394,244 MTCO2e**
ESTIMATED GHG REDUCTION (2050): *Cumulative for B1, B2, B3, B4*	**794,924 MTCO2e**

B3: Provide financial support to municipal stakeholders to weatherize existing public buildings.

DESCRIPTION

This initiative is aimed at providing financial support to municipal stakeholders to weatherize existing public buildings. This program is designed to help municipalities improve energy efficiency, reduce operating costs, and enhance the comfort and sustainability of public facilities. By improving energy efficiency in public buildings, municipalities demonstrate leadership in environmental stewardship and help mitigate

Buildings Sector

DESIRED RESULTS

By weatherizing public buildings, municipalities can achieve significant cost savings on energy bills and operational expenses over time. Weatherization upgrades lower heating and cooling costs, extend equipment lifespan, and reduce maintenance requirements, resulting in long-term financial benefits for municipal budgets.

IMPLEMENTATION FACTORS

This program could offer financial assistance to municipalities for weatherization projects in public buildings, including town halls, libraries, schools, community centers, and municipal offices. These upgrades will enhance building envelope performance and improve comfort and indoor air quality for community members.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
COUNTY WIDE	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
CITY AND COUNTIES	BUILDINGS UPGRADED

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Improved Air Quality
- Enhanced Resilience
- Job Creation
- Cost Saving

ESTIMATED GHG REDUCTIONS (2030): *Cumulative for B1, B2, B3, B4*	**394,244 MTCO2e**
ESTIMATED GHG REDUCTION (2050): *Cumulative for B1, B2, B3, B4*	**794,924 MTCO2e**

B4: Collaborate with municipal stakeholders to adopt latest building and energy codes.

DESCRIPTION

Energy-efficient building codes are designed to optimize energy consumption, reduce environmental impact, and enhance the overall performance of buildings. These codes typically incorporate a range of strategies aimed at improving building efficiency and sustainability. This initiative would work with municipalities on incorporating the current building and energy codes to create a more sustainable built environment.

Buildings Sector

DESIRED RESULTS

Sustainable building practices and energy-efficient codes play a crucial role in mitigating environmental impact, reducing carbon emissions, and creating healthier, more resilient communities.

IMPLEMENTATION FACTORS

implementing climate strategies requires a comprehensive and integrated approach that addresses mitigation, adaptation, and resilience across various sectors and scales. By working together and taking concerted action, we can mitigate the impacts of climate change and build a more sustainable and resilient future for all.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
CITY AND COUNTIES	POLICIES INCORPORATED

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Improved Air Quality
- Job Creation
- Enhanced Resilience
- Improved Access to Services

ESTIMATED GHG REDUCTIONS (2030): *Cumulative for B1, B2, B3, B4*	**394,244 MTCO2e**
ESTIMATED GHG REDUCTION (2050): *Cumulative for B1, B2, B3, B4*	**794,924 MTCO2e**

E1: Provide funding to municipal and government stakeholders to incorporate solar and energy storage at public facilities.

DESCRIPTION

This initiative will help public entities incorporate solar panels that can significantly reduce electricity bills for public buildings. By generating clean energy, public entities can offset their reliance on grid-supplied electricity, thereby lowering utility expenses. Adding energy storage systems provides backup power during grid outages or emergencies, enhancing the resilience of public services and critical infrastructure.

Energy Sector

DESIRED RESULTS

By generating clean, renewable energy from sunlight, public entities can contribute to mitigating climate change and improving local air quality, which can lead to health benefits for residents and wildlife.

IMPLEMENTATION FACTORS

Many jurisdictions have renewable energy targets or regulations aimed at reducing greenhouse gas emissions and promoting clean energy adoption. By investing in solar and energy storage, municipalities can demonstrate leadership in meeting these goals, potentially earning recognition, incentives, or funding support.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
CITY, COUNTIES, PUBLIC ENTITIES	AMOUNT OF INSTALLED SOLAR

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Job Creation
- Improved Air Quality
- Improved Access to Services
- Enhanced Resilience
- Cost Savings

ESTIMATED GHG REDUCTIONS (2030):	**11,218,850 MTCO2e**
ESTIMATED GHG REDUCTION (2050):	**22,836,050 MTCO2e**

E2: Work with partners to incentivize and promote demand-side management practices.

DESCRIPTION

Demand-side management often involves encouraging energy efficiency measures, such as upgrading appliances, implementing energy-efficient lighting, or improving insulation. These actions reduce overall energy consumption, leading to lower greenhouse gas emissions and environmental impact, contributing to sustainability goals and climate change mitigation efforts.

Energy Sector

DESIRED RESULTS

Demand-side management programs aim to reduce energy consumption during peak demand periods or shift it to times when energy is cheaper. By optimizing energy usage patterns, consumers can lower their electricity bills, leading to immediate cost savings for businesses and households.

IMPLEMENTATION FACTORS

Collaborating with partners to incentivize and promote demand-side management can yield numerous benefits for utilities, businesses, consumers, and society as a whole. By leveraging collaborative efforts and stakeholder engagement, utilities and policymakers can unlock the full potential of demand-side resources to build a more resilient, affordable, and sustainable energy future.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
REGIONAL STAKEHOLDERS	INCENTIVES PROVIDED

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Job Creation
- Improved Air Quality
- Improved Grid Stability
- Enhanced Resilience
- Cost Savings
- Emissions Reductions

ESTIMATED GHG REDUCTIONS (2030):	**4,816 MTCO2e**
ESTIMATED GHG REDUCTION (2050):	**9,710 MTCO2e**

E3: Finance projects at port facilities and industrial locations that support the shift from fossil fuels to low carbon energy sources.

DESCRIPTION

Shifting from fossil fuels to low-carbon energy sources such as renewable energy and electrification can significantly reduce GHG, and air pollutants emitted by industry and port operations. Which are often significant sources of air pollution due to equipment powered by diesel engines. Transitioning to cleaner energy sources can improve local air quality, benefiting the health and well-being of nearby communities and port workers.

Energy Sector

DESIRED RESULTS

Low carbon energy sources offer a range of benefits, including environmental, economic, and social advantages. By embracing sustainability and innovation, ports and industry can position themselves for long-term success in a rapidly evolving global economy while contributing to efforts to address climate change.

IMPLEMENTATION FACTORS

Ports and industry play a crucial role in global trade and transportation networks, by financing projects that facilitate the adoption of low-carbon energy sources, ports can help mitigate climate change by reducing their carbon footprint and supporting the transition to a more sustainable, low-emission economy.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
PORTS AND INDUSTRY	PROJECTS COMPLETED

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Job Creation
- Improved Air Quality
- Improved Public Health
- Enhanced Resilience
- Improved Access to Services
- Reduced Noise Pollution

ESTIMATED GHG REDUCTIONS (2030):	**1,987,530 MTCO2e**
ESTIMATED GHG REDUCTION (2050):	**8,612,630 MTCO2e**

T1: Provide incentives to regional small businesses to incorporate commute reduction programs and promote alternatives to driving alone.

DESCRIPTION

A small business commute reduction incentive would target and encouraging small businesses to implement and incentivize sustainable transportation options, such as carpooling, public transit, biking, walking, telecommuting, and alternative work schedules, the program aims to reduce traffic congestion, improve air quality, alleviate parking demand, and enhance employee well-being.

Transportation Sector

DESIRED RESULTS

The initiative would reduce traffic congestion, air pollution, and greenhouse gas emissions by promoting the use of sustainable transportation modes and reducing reliance on single-occupancy vehicles for commuting purposes. Also helps small businesses reduce transportation-related costs, such as parking fees, fuel expenses, vehicle maintenance, and employee travel reimbursements, leading to potential cost savings and improved financial sustainability.

IMPLEMENTATION FACTORS

Overall, a small business commute reduction incentive program offers a win-win solution for small businesses, employees, and communities by promoting sustainable transportation choices, reducing environmental impacts, and fostering economic growth and prosperity.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
MPO AND COMMUNITY	MEASURE MODE SHIFT

LOW-INCOME AND DISADVANTAGE COMMUNITY BENEFITS:

- Improved Air Quality
- Improves Health Outcomes
- Cost Savings
- Mode Shift
- Reduced Congestion
- Employee Satisfaction

ESTIMATED GHG REDUCTIONS (2030):	**2,144,751 MTCO2e**
ESTIMATED GHG REDUCTION (2050):	**6,462,920 MTCO2e**

T2: Invest in partnerships to encourage van pools, vehicle sharing, and micro transit options for rural and disadvantaged communities.

DESCRIPTION

Rural commute reduction programs are a collaborative initiative that invests in partnerships to encourage vanpools, vehicle sharing, and micro transit for residents of rural and disadvantaged communities. By providing support, resources, and incentives, the program aims to address transportation barriers, improve mobility options, and enhance access to employment, education, healthcare, and essential services.

Transportation Sector

DESIRED RESULTS

The initiative represents a collaborative approach to addressing access to employment, education, healthcare, and essential services for residents of rural and disadvantaged communities, particularly those without access to reliable transportation options. Also, it reduces vehicle miles traveled (VMT), traffic congestion, air pollution, and greenhouse gas emissions by promoting ridesharing and vanpooling as more sustainable alternatives to single-occupancy vehicle travel.

IMPLEMENTATION FACTORS

The initiative addresses transportation disparities and promotes social equity by ensuring that residents of rural and disadvantaged communities have access to affordable, reliable, and accessible transportation options.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIMEFRAME
RURAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
MPO AND COMMUNITY	PARTICIPATION RATES

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Improved Air Quality
- Cost Savings
- Reduced Congestion
- Increased Transportation Alternatives
- Health and Well-being

ESTIMATED GHG REDUCTIONS (2030): *Cumulative for T2 and T6*	**27,362 MTCO2e**
ESTIMATED GHG REDUCTION (2050): *Cumulative for T2 and T6*	**19,027 MTCO2e**

T3: Allocate resources to government and commercial fleets to increase adoption of low and zero emission vehicles and high efficiency fuels.

DESCRIPTION

The program is a collaborative initiative designed to accelerate the adoption of low and zero-emission vehicles (ZEVs) among government and commercial fleets. By providing funding and incentives, the program aims to support fleet operators in transitioning to cleaner and more sustainable transportation options, thereby reducing greenhouse gas emissions, improving air quality, and advancing the transition to a low-carbon economy.

Transporttion Sector

DESIRED RESULTS

Environmental impacts of the program include reduced greenhouse gas emissions, criteria air pollutants, and fossil fuel consumption associated with transportation, leading to improved air quality, public health outcomes, and climate change mitigation.

IMPLEMENTATION FACTORS

Action demonstrates leadership and commitment to sustainability, climate action, and environmental stewardship by partnering with government agencies, private sector stakeholders, and community organizations to advance the transition to a cleaner, more sustainable transportation system while mitigating the impacts of climate change and building a more sustainable and resilient future for all.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
MUNICIPAL AND INDUSTRY	FLEETS ENGAGED

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Improved Air Quality
- Cost Savings
- Job Creation
- Economic Development
- Improved access to services
- Increased Resilience

ESTIMATED GHG REDUCTIONS (2030): *Cumulative for T3 and T4*	**1,116,763 MTCO2e**
ESTIMATED GHG REDUCTION (2050): *Cumulative for T2 and T6*	**3,483,635 MTCO2e**

T4: Provide financial assistance to stakeholders with the installation of electric vehicle infrastructure in low-income communities.

DESCRIPTION

The program is a targeted initiative aimed at providing financial assistance and support for the installation of electric vehicle (EV) charging infrastructure in low-income communities. By addressing barriers to EV adoption and promoting equitable access to clean transportation options, the program aims to improve air quality, reduce greenhouse gas emissions, and advance transportation equity and environmental justice.

Transportation Sector

DESIRED RESULTS

The activity improves air quality, reduces greenhouse gas emissions, and mitigates the disproportionate environmental burdens faced by low-income communities and addressing public health concerns related to emissions from combustion vehicles.

IMPLEMENTATION FACTORS

This action advances climate action goals and supports the transition to a low-carbon transportation system by promoting the adoption of zero-emission vehicles and clean energy infrastructure in communities most vulnerable to climate impacts and increases access to clean transportation options and reduces transportation costs for residents.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
COMMUNITY	EQUIPTMENT INSTALLED

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Improved Air Quality
- Climate Mitigation
- Increased Equity
- Increased Transportation Alternatives
- Improved access to services
- Community Empowerment

ESTIMATED GHG REDUCTIONS (2030): *Cumulative for T3 and T4*	**1,116,763 MTCO2e**
ESTIMATED GHG REDUCTION (2050): *Cumulative for T2 and T6*	**3,483,635 MTCO2e**

T5: Collaborate with stakeholders to incorporate improvements to active transportation infrastructure and services.

DESCRIPTION

Promoting physical activity, improves public health outcomes, and reduces the prevalence of chronic diseases such as obesity, diabetes, and cardiovascular diseases by providing opportunities for active transportation and active living. Aimed at enhancing services that support walking, cycling, and other forms of active transportation. The program seeks to create safer, more accessible, and connected infrastructure networks.

Transportation Sector

DESIRED RESULTS

Activity reduces greenhouse gas emissions, air pollution, and reliance on fossil fuels by shifting trips from motorized vehicles to walking and cycling, supporting climate change mitigation, and environmental health.

IMPLEMENTATION FACTORS

The program will engage with diverse stakeholders, including government agencies, transportation authorities, public health organizations, community groups, businesses, schools, and residents, to establish a collaborative framework for planning, implementing, and evaluating active transportation initiatives.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
CITY AND COUNTIES	IMPROVEMENTS IMPLEMENTED

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Improved Air Quality
- Health and Well-being
- Economic Development
- Increased Transportation Alternatives
- Improved Access to Services
- Enhanced Safety

ESTIMATED GHG REDUCTIONS (2030):	**24,114 MTCO2e**
ESTIMATED GHG REDUCTION (2050):	**72,664 MTCO2e**

T6: Incentivize multimodal improvements in Capital construction projects.

DESCRIPTION

A collaborative initiative designed to incentivize the integration of multimodal transportation improvements into capital construction projects. By providing financial incentives, technical assistance, and planning support, to encourage stakeholders to prioritize the planning, design, and implementation of infrastructure projects that enhance connectivity, accessibility, and safety for all modes of transportation.

Transportation Sector

DESIRED RESULTS

This action reduces greenhouse gas emissions, air pollution, and reliance on single-occupancy vehicles by promoting alternative modes of transportation, reducing vehicle miles traveled, and supporting sustainable urban development patterns.

IMPLEMENTATION FACTORS

The activity fosters innovation and collaboration among transportation stakeholders, government agencies, and community partners to develop creative solutions, leverage resources, and advance the adoption of multimodal transportation strategies. Leading to more equitable, sustainable, and vibrant communities for all residents.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIMEFRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
CITY AND COUNTIES	PROJECTS ENHANCED

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Improved Air Quality
- Enhanced Resilience
- Economic Development
- Increased Transportation Alternatives
- Improved Access to Services
- Public Safety

ESTIMATED GHG REDUCTIONS (2030): *Cumulative for T2 and T6*	**27,362 MTCO2e**
ESTIMATED GHG REDUCTION (2050): *Cumulative for T2 and T6*	**19,027 MTCO2e**

AU1: Promote the use of native drought-tolerant, low-maintenance landscaping.

DESCRIPTION

Native plants are naturally adapted to local climate conditions, including temperature fluctuations, drought, and occasional extreme weather events such as hurricanes or heatwaves. Their resilience can help landscapes withstand environmental stresses and recover more quickly after disturbances. Native plants offer a unique aesthetic that reflects the natural beauty and character of the Gulf Coast region.

Agriculture Sector

DESIRED RESULTS

Native species capture carbon dioxide from the atmosphere through photosynthesis, helping to mitigate climate change by sequestering carbon. Additionally, trees and shrubs in native landscapes can improve air quality by filtering pollutants and releasing oxygen, thereby enhancing the overall environmental quality of urban and suburban areas.

IMPLEMENTATION FACTORS

Native plants are well-adapted to the local climate and soil conditions, requiring minimal supplemental watering once established. Drought-tolerant landscaping significantly reduces outdoor water usage, helping to conserve water resources, particularly during periods of water scarcity or drought.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
COMMUNITY PARTNERS	ENGAGEMENT EFFORTS

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Improved Air Quality
- Cost Savings
- New Green Space
- Enhanced Resilience
- Carbon Sequestration
- Water Conservation

ESTIMATED GHG REDUCTIONS (2030):	**867 MTCO2e**
ESTIMATED GHG REDUCTION (2050):	**1,748 MTCO2e**

AU2: Work with municipal partners to restore degraded lands to increase carbon storage.

DESCRIPTION

By restoring degraded lands, municipal partners increase carbon storage offering a holistic approach to addressing environmental challenges and promoting sustainability for present and future generations. Restoring degraded lands can also create economic opportunities and generate jobs in sectors such as conservation, landscaping, ecotourism while helping preserve biodiversity and protect valuable ecological resources.

Agriculture Sector

DESIRED RESULTS

Restoring degraded lands can help mitigate climate change by sequestering carbon dioxide from the atmosphere. Healthy ecosystems act as carbon sinks, absorbing and storing carbon through photosynthesis. Restored natural landscapes can help mitigate flood risks and enhance community resilience to extreme weather events.

IMPLEMENTATION FACTORS

Collaborating with municipal partners on land restoration projects can foster community engagement, partnerships, and stewardship of natural resources. Restoration initiatives provide opportunities for local residents, businesses, schools, and community organizations to get involved in conservation efforts, volunteer activities, and environmental education programs.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
MUNICIPAL AND COMMUNITY	PROGRAMS LAUNCHED

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Job Creation
- Improved Air Quality
- Enhanced Biodiversity
- Improved Access to Services
- Carbon Sequestration
- New Green Space

ESTIMATED GHG REDUCTIONS (2030): *Cumulative for AU2 and AU3*	**278,055 MTCO2e**
ESTIMATED GHG REDUCTION (2050): *Cumulative for AU2 and AU3*	**2,181,679 MTCO2e**

AU3: Work with municipal and community partners to protect and enhance greenspace.

DESCRIPTION

Partnership initiatives to protect green spaces foster collaboration between municipal governments, community organizations, and local stakeholders to protect, preserve, and enhance greenspaces, thereby providing a host of environmental, social, economic, and health benefits for communities and ecosystems. The program would empower the community and involve residents in decision-making processes.

Agriculture Sector

DESIRED RESULTS

Protecting and restoring vital ecosystems, preserves biodiversity, enhances wildlife habitat, and contributes to climate change mitigation through carbon sequestration and air quality improvement.

IMPLEMENTATION FACTORS

Greenspace mitigates the impacts of urbanization, such as heat islands, flooding, and water pollution, by increasing green infrastructure, enhancing stormwater management, and improving urban microclimates. This initiative would promote access to greenspaces for all residents, regardless of income, race, or ethnicity, and addresses environmental justice concerns by prioritizing greenspace investments in underserved communities.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
MUNICIPAL AND COMMUNITY	POLICIES INCORPORATED

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Job Creation
- Improved Air Quality
- Community Well-Being
- Educational Oppurtunities
- Enhanced Resilience
- Economic Development
- Provides Wildlfe Habitat

ESTIMATED GHG REDUCTIONS (2030): *Cumulative for AU2 and AU3*	**278,055 MTCO2e**
ESTIMATED GHG REDUCTION (2050): *Cumulative for AU2 and AU3*	**2,181,679 MTCO2e**

AU4: Support partners with expanding urban tree planting programs in disadvantaged communities

DESCRIPTION

Urban tree equity programs foster collaboration, and this initiative is aimed at expanding urban tree planting efforts in low-income and disadvantaged communities. The program will be designed to address environmental inequities, improve community health and well-being, enhance urban biodiversity, and mitigate the impacts of climate change through strategic tree planting and community engagement.

Agriculture Sector

DESIRED RESULTS

Tree planting programs provide numerous health benefits, including shade provision, heat stress reduction, air pollution mitigation, and opportunities for physical activity and recreation, leading to improved public health outcomes and quality of life.

IMPLEMENTATION FACTORS

Urban tree equity programs represent a holistic approach to urban forestry that prioritizes equity, community engagement, and environmental justice, ultimately creating healthier, more resilient, and more vibrant communities for all residents. This program also stimulates economic activity, job creation, and workforce development opportunities through tree planting projects, green infrastructure investments, and related green jobs in urban forestry, landscaping, and environmental restoration.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
COMMUNITY PARTNERS	TREES PLANTED

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Improved Air Quality
- Economic Development
- Social Empowerment
- Improved Health Benefits
- Educational Oppurtunities
- Enhanced Resilience

ESTIMATED GHG REDUCTIONS (2030):	**22,541 MTCO2e**
ESTIMATED GHG REDUCTION (2050):	**97,678 MTCO2e**

MM1: Work with stakeholders to promote and incentivize recycling, reuse, and other voluntary waste reduction programs.

DESCRIPTION

This initiative is aimed at promoting sustainability and incentivizing recycling, reuse, and other voluntary waste reduction efforts within our community. Through this program, we aim to collaborate with local businesses, community organizations, and government agencies to leverage resources, share best practices, and amplify our impact in the waste reduction area.

Material Management Sector

DESIRED RESULTS

Waste reduction programs contribute to environmental sustainability by conserving natural resources, reducing greenhouse gas emissions associated with waste disposal, and minimizing environmental pollution. Achieving these environmental benefits helps mitigate the impact of waste on ecosystems, wildlife, and human health.

IMPLEMENTATION FACTORS

Implementation will include programs and initiatives that encourage stakeholders to voluntarily participate in recycling, reuse, and waste reduction programs. This may include setting up recycling stations, implementing composting programs, organizing community clean-up events, or supporting initiatives like plastic reduction campaigns.

GEOGRAPHIC LOCATION	IMPLEMENTATION TIME FRAME
REGIONAL	SHORT

IMPLEMENTATION PARTNERS	METRIC FOR TRACKING
REGIONAL STAKEHOLDERS	WASTE DIVERSION RATES

LOW-INCOME AND DISADVANTAGED COMMUNITY BENEFITS:

- Improved Public Health
- Workforce Development Opportunities
- Enhanced Community Engagement

ESTIMATED GHG REDUCTIONS (2030):	**734,818 MTCO2e**
ESTIMATED GHG REDUCTION (2050):	**3,184,213 MTCO2e**

2.3 Low-Income and Disadvantaged Communities Benefits Analysis

2.3.1 MAPPING LIDACS

For the purposes of the CPRG program, the EPA defines LIDACs as:

- Any census tract that is included as disadvantaged in the Climate and Economic Justice Screening Tool (CEJST)[2]; and/or
- Any census block group that is at or above the 90th percentile for any of EPA's EJScreen Supplemental Indexes[3] (e.g., Particulate Matter 2.5, Ozone, Diesel Particulate Matter, Air Toxics Cancer Risk, Air Toxics Respiratory Hazard Index, etc.) when compared to the nation or state.

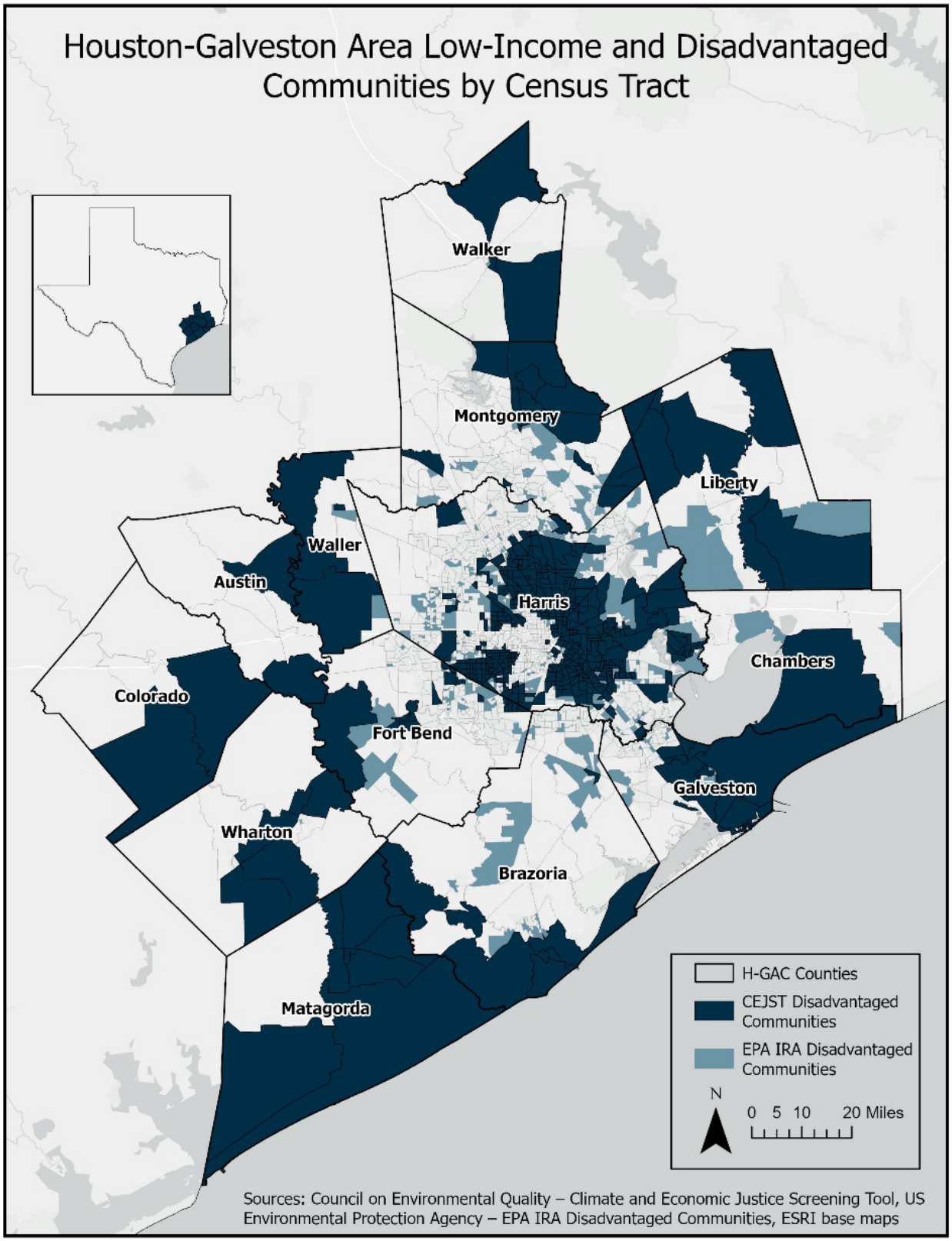
The PCAP for the H-GAC region uses both CEJST and the EPA EJScreen Supplemental Indexes to identify LIDACs, as this allows for a more inclusive definition of LIDACs.

The areas identified as LIDACs are provided in a map (Figure 4) and listed in Appendix E. Across the 13-county H-GAC region, 507 census tracts were identified as disadvantaged using CEJST (shown as dark blue in Figure 4) and an additional 465 block groups were identified as disadvantaged using the EPA EJScreen Supplemental Indexes (shown as light blue).

The 13-county H-GAC region covers an area of approximately 12,500 square miles and is home to over 7 million people. The census tracts and block groups identified as LIDACs by CEJST and the EPA EJScreen Supplemental Indexes combined equal 8,126 square miles or approximately 65% of the area included in the H-GAC region. On a population basis, over 5.6 million people, or 77% of the population in the H-GAC region live in areas identified as LIDACs. This is due to the high concentration of LIDACs in Harris County, the most populous county in the H-GAC region.

[2] Data for CEJST disadvantaged communities are included in the "EPA IRA Disadvantaged" layer and available for download through the CEJST website (https://screeningtool.geoplatform.gov/en/downloads).
[3] The EPA created a layer in EJScreen to identify disadvantaged communities using the Supplemental Indexes. This layer is called "EPA IRA Disadvantaged" and is available as an ArcGIS map (https://epa.maps.arcgis.com/home/item.html?id=f3be939070844eac8a14103ed6f9affd) and a .csv file (https://gaftp.epa.gov/EPA_IRA_Public/).

Figure 5: Map of Low-Income and Disadvantaged Communities in the 13-county H-GAC region.



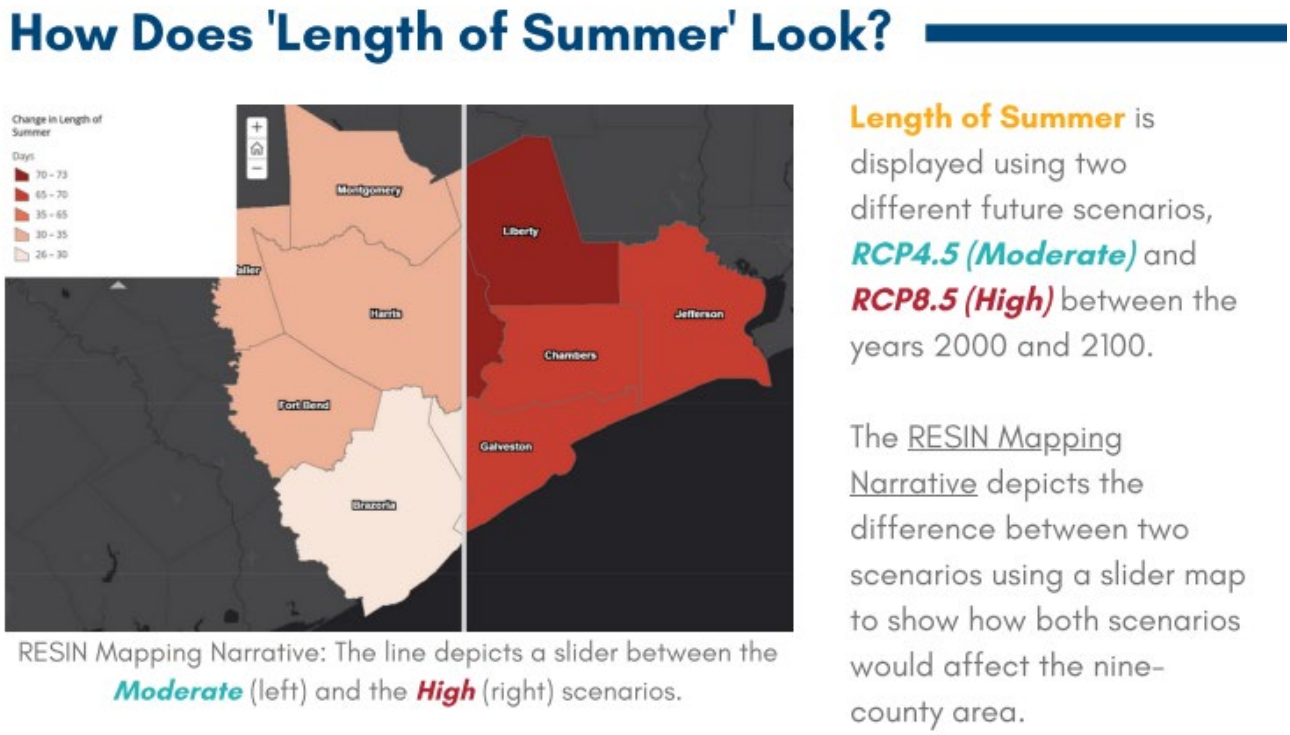
2.3.2 CLIMATE IMPACTS AND RISKS

In the last 20 years, the Texas Gulf region has experienced a drought of record, frequent torrential rains, dangerous floods, multiple hurricanes, and extreme summer heat. The Houston region is particularly susceptible to climate impacts including extreme weather events, flooding, extreme heat, and drought. The degree to which people and places have the resources and skills to cope with climate change's impacts defines their vulnerability or resilience to a particular climate risk.

To mitigate the impact of climate disasters, stakeholders in the region are urgently seeking solutions to protect the health, safety, and welfare of the public from future catastrophes. There are currently two local resources on climate risk assessment available for the region. In 2020, the City of Houston published the Climate Impact Assessment for the City of Houston, which used downscaled climate projection data to understand the local heat, drought, and precipitation risks associated with climate change while also demonstrating the importance of reducing and capturing emissions of GHGs. By comparing historical climate observations from 1950, the assessment report examined forecasted temperature and precipitation across the greater Houston region through 2100. This analysis showed that, in the future, the Houston region can expect to have longer heatwaves and higher temperatures, and experience more frequent and severe periods of both drought and heavy precipitation.

In addition, funding from the Global Giving Foundation enabled HARC to develop a Resilience Science Information Network (RESIN) Portal of the Upper Texas Gulf Coast. RESIN brings together climate scenario, environmental and LIDAC data sets, to identify cross-connections and to develop value-added data for communities engaged in resilience and adaptation efforts. RESIN is currently available for 8 out of the 13 counties in the region, including Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller. For example, climate scenario analysis indicates that the inland counties of Waller, Montgomery, Liberty, Harris, and Fort Bend are expected to experience a longer summer season by end of century than the coastal counties of Brazoria, Galveston, and Chambers (Figure 5). Waller and Montgomery are projected to have the largest increase of days per year above 100 °F.

Figure 6: Screenshot of RESIN Portal Factsheet on climate indicator 'Length of Summer'



Climate change exacerbates existing health disparities within our communities by adding strain to social, economic, and environmental conditions. LIDACs defined as having these disparities are more likely to struggle financially with heating and cooling their homes to adapt to extreme temperatures, may lack reliable transportation, and are often located in flood and heat-prone areas.

According to EPA's Climate Change and Social Vulnerability in the United States Report (2021), LIDACs in the Houston region are more likely to experience the following vulnerabilities associated with a changing climate:

- Air Quality and Health
- Extreme Temperature and Health
- Drought
- Flooding
- Infrastructure Damage

Table 8: Qualitative description of climate risks, impacts, and vulnerabilities for LIDACs in the Houston Region.

Climate Impacts	Risks and vulnerabilities for LIDACs
Air Quality and Health	In the Houston region, concentrations of particulate matter less than 2.5 microns in diameter are expected to increase due to climate change, resulting in 0 – 10 additional premature deaths per 100,000 people 65 years and older per year under 2°C warming scenario. In a 4°C scenario, this estimate increases to 10 – 30 additional premature deaths per 100,000 people 65 and older under per year. Industrial facilities are often near areas in which many residents are people of color or considered low-income.
Extreme Temperature and Health	The estimated increase in annual premature mortality rates due to extreme temperatures for the Houston region is between 2 to 4 per 100,000 people under 2°C warming and between 6 to 8 per 100,000 people under 4°C warming.
Drought	Increased need for irrigation to make up for lack of water places additional stress on water resources like aquifers and reservoirs. As fresh-water habitat availability is limited, the diversity of plant and animal species may decrease. Droughts increase the risk of wildfires and worsen air quality putting several vulnerable populations at risk, including children, elderly or pregnant people, people with existing health issues, and low-income households. Lower surface water levels due to drought and longer heatwaves mean that a larger portion of water in waterways can be made up of treated effluent from upstream wastewater plants instead of rainfall.
Flooding	The proximity of many water and wastewater facilities to waterways and low-lying areas makes the infrastructure more susceptible to damaging effects of flooding, caused by extreme precipitation and sea level rise.

	High precipitation events can inhibit road use, particularly at low water crossings, flood train tracks or block those tracks by depositing debris, and limit air travel. This can be a health hazard for vulnerable populations such as the elderly or those with existing health conditions if they cannot get to health services.
Infrastructure Damage	Heat can affect transportation infrastructure, causing deformation in materials. Extreme temperatures and extended heat waves may result in train derailment if proper maintenance and speed reductions are not implemented. Temperature fluctuations are of particular concern for bridges because they increase stress on bridge joints. Higher temperatures mean more energy demand for cooling in the future; this can increase prices and disproportionally impact LIDACs. Rising sea levels limit the overhead height for boats traveling under bridges and can flood transportation routes in coastal areas. Flooding caused by extreme precipitation and rising sea levels can prevent a power plant from generating electricity or limit transport of fuel. Storms can damage power lines and substations. Drought limits water availability for coal, natural gas, and nuclear power plants reliant on water for cooling or hydroelectric power plants reliant on water for power generation.

2.3.3 ESTIMATED BENEFITS OF GHG EMISSION REDUCTION MEASURES TO LIDACS

Priority GHG reduction strategies included in the PCAP aim to reduce emissions from buildings, energy, transportation, and materials management sectors and capture additional carbon from the atmosphere using nature-based solutions. In many cases, projects that address a GHG emission reduction strategy may be physically located in a census tract that has been identified as a LIDAC, providing direct benefits to that community. Regional projects, such as

incentives to reduce VMT, provide indirect benefits to LIDACs by reducing air and noise pollution from roadways. Selected GHG reduction measures included in the PCAP and their estimated benefits to LIDACs are described in Table 7.

Table 9: Summary of selected GHG reduction measures and major corresponding LIDAC benefits included in the PCAP.

Action/ Measure	Description	LIDAC Benefits
Buildings		
B1: Foster partnerships with stakeholders to encourage rating, monitoring, and improved building efficiency.	Benchmarking and Energy Efficiency Retrofit programs, prioritizing programs that include workforce development.	Decreased energy burden, improved indoor air quality, workforce development
B2: Support small and minority and women owned businesses financially in efforts to incentivize energy efficiency solutions.	Green Lending programs, prioritizing investments in LIDAC communities.	Decreased energy burden, improved indoor air quality, financial benefits
B3: Provide financial support to municipal stakeholders to weatherize existing public buildings.	Municipal Building Weatherization/ Efficiency Programs, prioritizing project in LIDAC communities	Decreased energy burden, improved indoor air quality, improved resilience during extreme temperatures
Energy		
E1: Provide funding to municipal and other governmental stakeholders to incorporate solar and energy storage on public property.	Solar incentive and support programs, prioritizing projects in LIDAC communities	Improved outdoor air quality (by replacing diesel generators), improved resilience during extreme weather
E3: Finance projects at port facilities and industrial locations that support the shift from fossil fuels to low carbon energy sources.	Electrification Projects, prioritizing projects that include workforce development programs.	Improved outdoor air quality, workforce development

Transportation		
T2: Invest in partnerships to encourage van pools and vehicle sharing for rural and disadvantaged communities.	Incentives to reduce VMT	Improved outdoor air quality, increased mobility options, reduced transportation costs
T4: Provide financial assistance to stakeholders with the installation of EVSE in low-income and disadvantaged communities.	EVSE Infrastructure	Improved outdoor air quality, increased mobility options, reduced transportation costs
T5: Collaborate with stakeholders to incorporate improvements to bike and pedestrian infrastructure.	Bicycling and Pedestrian Facilities, prioritizing projects in LIDAC communities.	Improved outdoor air quality, increased mobility options, reduced transportation costs, improved safety
T6: Incentivize multimodal improvements in Capital construction projects.	Alternative Commute Infrastructure, prioritizing projects in LIDAC communities.	Improved outdoor air quality, increased mobility options, reduced transportation costs
Agriculture		
AU2: Work with municipal partners to restore degraded lands to increase carbon storage.	Restoration of carbon sinks, prioritizing programs in LIDAC communities and/or include workforce development.	Improved outdoor air quality, heat and flood mitigation, water conservation, ecosystem services
AU4: Support partners with expanding urban tree planting programs.	Tree planting programs, prioritizing programs in LIDAC communities and/or include workforce development.	Improved outdoor air quality, heat and flood mitigation, water conservation, beautification of public spaces, ecosystem services

2.4 Review of Authority to Implement

H-GAC is aware of several pieces of legislation passed by the State of Texas during its 88th Regular Session in early 2023 that limit the authority of political subdivisions. These new limitations affect the mechanisms by which political subdivisions can engage in environmental action and GHG reduction, chiefly by restricting the enactment and enforcement of measures (ordinances, regulations, etc.) that do not align with state law. SB784 establishes the exclusive jurisdiction of the state to regulate GHG emissions, preempting local regulation. SB1017 bars any measures that prohibit or restrict the use, sale, or lease of a mechanical engine based on its fuel source. However, it does not limit the encouragement, promotion or provision of rebates for such actions. HB2127 provides statewide consistency by returning the sovereign regulatory powers to the state as it pertains to several codes documents, including agriculture, business and commerce, natural resources, and property.

Coordinating entities of these implementation measures will have the necessary statutory and regulatory authority. Our implementation measures are voluntary, and incentive based, because the legislation listed above bars H-GAC, a political subdivision, from enacting or enforcing disincentives or mandates. H-GAC will request that sub awardees conduct their own assessments of authority to implement at the local level.

3.0 Next Steps

Meaningful Engagement: Meaningful community engagement is essential for the comprehensive climate action planning (CCAP) effort. It will involve actively engaging diverse stakeholders throughout the planning process to ensure their voices, perspectives, and needs are heard and considered. This engagement goes beyond simple information dissemination or consultation; it fosters collaboration, builds trust, and empowers communities to play an active role in shaping the climate action plan. Moving forward, H-GAC plans to enhance engagement efforts for the CCAP, including hiring a marketing firm and utilizing social media and direct outreach methods.

CPRG Implementation Grant: The PCAP was prepared to position HGAC to compete for Implementation Grants. The PCAP is a pre-requisite for competing in the second phase of the CPRG program, which will competitively award $4.6 billion for implementation. The application for an implementation award under the CPRG is due April 1, 2024, and will need to include a PCAP that describes the measures or projects, and which entity will carry out with the implementation. H-GAC will be working with eligible stakeholders to develop a coalition application.

CPRG Deliverable #2: The PCAP provides the foundation for a more comprehensive analysis in the second deliverable, the Comprehensive Climate Action Plan (CCAP), is due within 2 years from the date of the planning grant award. It will cover all significant greenhouse gas (GHG) sources/sinks and sectors in H-GAC's metropolitan service area, establish both near-term and long-term GHG emission reduction goals, and propose strategies and measures to achieve these goals. H-GAC and the CPRG sub-awardees will embark on this effort in early 2024.

4.0 Appendix

Appendix A: List of Figures

Appendix B: List of Tables

Appendix C: Acronyms/Definitions

Acronym	Expansion
ASL	American Sign Language
CO_2	Carbon dioxide
CEJST	Climate and Economic Justice Screening Tool
CPRG	Climate Pollution Reduction Grant
CW	Community-wide
CCAP	Comprehensive Climate Action Plan
EVSE	Electric Vehicle Supply Equipment
EJScreen	Environmental Justice Screening and Mapping tool
EPA	Environmental Protection Agency
GHG	Greenhouse Gas
GHGRP	Greenhouse Gas Reporting Program
HARC	Houston Advanced Research Center
H-GAC	Houston-Galveston Area Council
IRA	Inflation Reduction Act
ICLEI	International Council for Local Environmental Initiatives
LIDAC	Low Income/Disadvantaged Communities
CH_4	Methane
$MTCO_2e$	Metric tons (or tonnes) of carbon dioxide equivalents
MSA	Metropolitan Statistical Area
MSW	Municipal Solid Waste
NAAQS	National Ambient Air Quality Standard
NEI	National Emissions Inventory
N_2O	Nitrous oxide
NGOs	Non-Governmental Organizations
PCAP	Priority Climate Action Plan
RESIN	Resilience Science Information Network
SLOPE	State and Local Planning for Energy
TCEQ	Texas Commission on Environmental Quality
TxDMV	Texas Department of Motor Vehicles
DOE	U.S. Department of Energy
VMT	Vehicle Miles Traveled
ZEV	Zero-Emission Vehicle

Definitions

Anthropogenic: refers to environmental impacts, processes, or pollutants that are caused or produced by human activities.

Benchmarking: A way of measuring the performance of a resource, service, or process against a comparison standard to identify internal opportunities for improvement (e.g., building energy use per square foot) (Source: Houston CAP).

Carbon dioxide equivalent (CO_2e): Standard unit for reporting GHG concentrations (Source: Houston CAP).

Comprehensive Climate Action Plan (CCAP): The second deliverable for the CPRG program that expands on the PCAP and involves a more in-depth analysis of GHG emissions within the service area, projections, and emissions reductions and includes additional emission reduction strategies and more comprehensive stakeholder engagement.

Climate: The average weather pattern for a region over a timescale of 30 years or more (Source: Houston CAP).

Energy burden: the percentage of gross household income spent on energy costs (Source: DOE).

Environmental justice: The just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other Federal activities that affect human health and the environment (Source: EPA).

Fossil fuel: non-renewable energy sources derived from ancient organic matter, such as coal, oil, and natural gas, used primarily for energy production and industrial processes.

Green lending programs: Green lending programs provide loans to support environmentally beneficial projects or initiatives, such as renewable energy projects, energy efficiency improvements, sustainable practices, and environmental compliance.

Grid electricity: Grid electricity is power generated from centralized plants and distributed through a network of transmission lines for use in homes, businesses, and industries.

Justice40 Initiative: Federal government initiative where 40 percent of the overall benefits of certain federal investments flow to disadvantaged communities (see: LIDAC) that are marginalized, underserved, and overburdened by pollution (Source: The White House).

Low Income/Disadvantaged Communities (LIDAC): Any census tract that is included as disadvantaged in the Climate and Economic Justice Screening Tool (CEJST); and/or any block group that is at or above the 90th percentile for any of EJScreen's Supplemental Indexes when compared to the nation or state, and/or any geographic area within Tribal lands and indigenous areas as included in EJScreen (Source: EPA).

Multimodal: The integration of multiple modes of transportation such as walking, bicycling, public transportation systems, and driving into public infrastructure (Source: Houston CAP).

Non-attainment: Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for a NAAQS (Source: EPA).

Ozone: a highly reactive gas composed of three oxygen atoms. It is both a natural and a man-made product that occurs in the Earth's upper atmosphere (Source: EPA)

Priority Climate Action Plan (PCAP): The first deliverable of CPRG planning grant, which is a report that outlines near-term, high-priority, implementation ready GHG reduction measures and includes a GHG inventory, quantified reduction measures, an analysis of benefits to low income and disadvantaged communities, and a review of implementation authority.

Social Vulnerability: refers to the potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreaks (Source: CDC).

Solid Waste: refers to any material discarded in a landfill, encompassing various items from household garbage to industrial waste.

Stationary (Fossil) Fuel: refers to energy sources such as coal, oil, natural gas, refinery gas, municipal waste, and biomass that are burned and utilized for stationary activities like electricity generation, heating, and industrial processes, including power plants and industrial boilers.

Sub-awardee: An entity receiving a portion of grant funds.

Transportation: Various modes of moving people and goods from one place to another.

Underserved community: populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life (Source: The White House).

Vehicle miles traveled (per capita): The total number of miles traveled by vehicles across a certain geographic region or area during a specific time-period divided by the population of that area (Source: Houston CAP).

Weatherization: Relatively inexpensive alterations/ retrofits made to a building that result in increased energy efficiency and savings as well as thermal comfort (Houston CAP).

Appendix D: County-level GHG Inventories

Houston Region - Priority Greenhouse Gas (GHG) Inventory by County and Category														
		GHG Emissions (tonnes CO2e)												
		Stationary Fuel Combustion			Power Consumption (Grid Electricity)			Transportation Fuel Combustion			Solid Waste			
County	Population	Residential	Commercial	Industry	Residential	Commercial	Industry	On-road	Railway	Waterborne navigation		Total	Emissions Per Capita
Austin County	30,421	6,726	8,270	64,892	69,058	38,229	49,192	399,033	22,863	-	-	658,262	21.6
Brazoria County	378,858	107,440	92,937	25,104,864	654,109	474,609	556,053	1,248,471	27,562	150,528	544,383	28,960,955	76.4
Chambers County	48,721	9,136	13,896	12,315,134	86,172	78,089	134,756	683,082	720	48,041	239,206	13,608,232	279.3
Colorado County	20,592	5,538	7,134	1,179,201	43,881	32,899	66,164	554,038	16,761	-	25,601	1,931,218	93.8
Fort Bend County	860,124	290,798	195,068	14,083,675	1,250,210	995,667	611,624	2,175,651	45,836	-	1,722,658	21,371,188	24.8
Galveston County	355,309	118,777	104,776	15,175,531	643,054	518,881	479,560	1,019,926	11,834	608,159	578,374	19,258,870	54.2
Harris County	4,735,287	1,592,778	2,291,475	76,503,088	7,887,353	12,389,514	9,021,080	17,155,881	96,359	832,713	2,609,883	130,380,125	27.5
Liberty County	97,382	11,943	15,070	384,575	156,844	70,079	61,931	438,198	35,089	2	-	1,173,731	12.1
Matagorda County	36,366	10,656	13,462	1,316,587	76,652	66,239	71,029	234,562	8,511	34,624	-	1,832,322	50.4
Montgomery County	650,261	191,096	211,202	2,693,509	76,652	1,044,312	520,216	2,402,691	25,792	3	403,385	7,568,859	11.6
Walker County	78,322	8,469	15,399	42,646	107,903	72,842	29,602	659,675	6,547	-	-	943,083	12.0
Waller County	59,474	8,024	16,218	99,389	91,179	94,326	76,945	470,347	1,367	-	-	857,796	14.4
Wharton County	41,697	12,967	17,758	3,430,492	89,561	85,236	66,645	460,089	17,335	-	-	4,180,084	100.2
13-County Region	**7,392,814**	**2,374,347**	**3,002,665**	**152,393,585**	**11,232,627**	**15,960,922**	**11,744,797**	**27,901,644**	**316,577**	**1,674,070**	**6,123,490**	**232,724,725**	**31.5**

Austin County
Population: 30,421

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	79,888	12%
Grid Electricity	156,479	24%
Transportation	421,896	64%
Solid Waste	Not Available	-
Total	**658,263**	**100%**

Brazoria County
Population: 378,858

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	25,305,241	87%
Grid Electricity	1,684,770	6%
Transportation	1,426,561	5%
Solid Waste	544,383	2%
Total	**28,960,955**	**100%**

Chambers County
Population: 48,721

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	12,338,166	91%
Grid Electricity	299,016	2%
Transportation	731,843	5%
Solid Waste	239,206	2%
Total	**13,608,231**	**100%**

Colorado County
Population: 20,592

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	1,191,874	62%
Grid Electricity	142,944	7%
Transportation	570,800	30%
Solid Waste	25,601	1%
Total	**1,931,219**	**100%**

Fort Bend County
Population: 860,124

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	14,569,541	68%
Grid Electricity	2,857,501	13%
Transportation	2,221,487	10%
Solid Waste	1,722,658	8%
Total	**21,371,187**	**100%**

Galveston County
Population: 355,309

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	15,399,084	80%
Grid Electricity	1,641,494	9%
Transportation	1,639,919	9%
Solid Waste	578,374	3%
Total	**19,258,871**	**100%**

Harris County
Population: 4,735,287

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	80,387,341	62%
Grid Electricity	29,297,948	22%
Transportation	18,084,953	14%
Solid Waste	2,609,883	2%
Total	**130,380,125**	**100%**

Liberty County
Population: 97,382

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	411,587	35%
Grid Electricity	288,854	25%
Transportation	473,289	40%
Solid Waste	Not Available	-
Total	**1,173,730**	**100%**

Matagorda County
Population: 36,366

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	1,340,705	73%
Grid Electricity	213,920	12%
Transportation	277,696	15%
Solid Waste	Not Available	-
Total	**1,832,321**	**100%**

Montgomery County
Population: 650,261

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	3,095,807	41%
Grid Electricity	1,641,180	22%
Transportation	2,428,487	32%
Solid Waste	403,385	5%
Total	**7,568,859**	**100%**

Walker County
Population: 78,322

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	66,514	7%
Grid Electricity	210,347	22%
Transportation	666,222	71%
Solid Waste	Not Available	-
Total	**943,083**	**100%**

Waller County
Population: 59,474

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	123,631	14%
Grid Electricity	262,450	31%
Transportation	471,714	55%
Solid Waste	Not Available	-
Total	**857,795**	**100%**

Wharton County
Population: 41,697

2021 Greenhouse Gas (GHG) Emissions Profile

GHG Emissions by Source Category	GHG Emissions (tonnes of CO_2e)	Percentage
Stationary Fuel Combustion	3,461,218	83%
Grid Electricity	241,442	6%
Transportation	477,424	11%
Solid Waste	Not Available	-
Total	**4,180,084**	**100%**

Appendix E: Lists of LIDACs

This list contains census tracts that are identified as disadvantaged by the CEJST screening tool. The data was downloaded from CJEST website[4]. The data was filtered by state (Texas), then by the 13 HGAC counties, and finally by "Identified as Disadvantaged".

List of Disadvantaged Communities within the Houston Region

Census tract 2010 ID	County Name
48015760100	Austin County
48015760502	Austin County
48039661200	Brazoria County
48039661300	Brazoria County
48039662700	Brazoria County
48039662900	Brazoria County
48039664200	Brazoria County
48039664300	Brazoria County
48039664400	Brazoria County
48039664501	Brazoria County
48071710500	Chambers County
48089750100	Colorado County
48089750200	Colorado County
48157670101	Fort Bend County
48157670102	Fort Bend County
48157670200	Fort Bend County
48157670300	Fort Bend County
48157670400	Fort Bend County
48157670602	Fort Bend County
48157671400	Fort Bend County
48157672301	Fort Bend County
48157672500	Fort Bend County
48157672601	Fort Bend County
48157672701	Fort Bend County
48157673700	Fort Bend County

Census tract 2010 ID	County Name
48201313700	Harris County
48201313800	Harris County
48201320100	Harris County
48201320200	Harris County
48201320500	Harris County
48201320601	Harris County
48201320602	Harris County
48201320700	Harris County
48201320800	Harris County
48201320900	Harris County
48201321000	Harris County
48201321100	Harris County
48201321200	Harris County
48201321300	Harris County
48201321401	Harris County
48201321500	Harris County
48201321600	Harris County
48201321800	Harris County
48201321900	Harris County
48201322000	Harris County
48201322100	Harris County
48201322200	Harris County
48201322600	Harris County
48201322700	Harris County
48201322800	Harris County

[4] https://screeningtool.geoplatform.gov/en/downloads#3/33.47/-97.5

48157674800	Fort Bend County
48157674900	Fort Bend County
48157675000	Fort Bend County
48157675100	Fort Bend County
48157675200	Fort Bend County
48157675300	Fort Bend County
48157675800	Fort Bend County
48167721000	Galveston County
48167721100	Galveston County
48167721600	Galveston County
48167721700	Galveston County
48167721800	Galveston County
48167721900	Galveston County
48167722200	Galveston County
48167722300	Galveston County
48167722600	Galveston County
48167722700	Galveston County
48167722800	Galveston County
48167722900	Galveston County
48167723000	Galveston County
48167723700	Galveston County
48167723900	Galveston County
48167724000	Galveston County
48167724101	Galveston County
48167724400	Galveston County
48167724500	Galveston County
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48167724700	Galveston County
48167724800	Galveston County
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48167726200	Galveston County
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48201323500	Harris County
48201323600	Harris County
48201323802	Harris County
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48201324100	Harris County
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48201330400	Harris County
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48201330700	Harris County
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48201331200	Harris County
48201331300	Harris County
48201331400	Harris County
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48201331602	Harris County
48201331700	Harris County
48201331800	Harris County
48201331900	Harris County
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48201332100	Harris County
48201332200	Harris County
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48201332400	Harris County
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48201332600	Harris County
48201332700	Harris County
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48201210900	Harris County
48201211000	Harris County
48201211100	Harris County
48201211200	Harris County
48201211300	Harris County
48201211400	Harris County
48201211500	Harris County
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48201221100	Harris County
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48201221500	Harris County
48201221600	Harris County
48201221700	Harris County
48201221800	Harris County
48201221900	Harris County
48201222000	Harris County
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48201333500	Harris County
48201333600	Harris County
48201333700	Harris County
48201333800	Harris County
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48201334001	Harris County
48201341201	Harris County
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48201342300	Harris County
48201343700	Harris County
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48201350500	Harris County
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48201420500	Harris County
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48201421102	Harris County
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48201421202	Harris County
48201421300	Harris County
48201421401	Harris County
48201421402	Harris County
48201421403	Harris County
48201421500	Harris County
48201421600	Harris County
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48201422301	Harris County
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48201222402	Harris County
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48201222502	Harris County
48201222503	Harris County
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48201231200	Harris County
48201231300	Harris County
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48201231700	Harris County
48201231800	Harris County
48201231900	Harris County
48201232000	Harris County
48201232100	Harris County
48201232301	Harris County
48201232402	Harris County
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48201422800	Harris County
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48201423000	Harris County
48201423100	Harris County
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48201423302	Harris County
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48201432300	Harris County
48201432400	Harris County
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48201432600	Harris County
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48201433002	Harris County
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48201433100	Harris County
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48201433501	Harris County
48201433502	Harris County
48201433600	Harris County
48201440100	Harris County
48201450400	Harris County
48201450802	Harris County

48201232500	Harris County
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48201232701	Harris County
48201232702	Harris County
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48201232900	Harris County
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48201233101	Harris County
48201233102	Harris County
48201233103	Harris County
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48201233300	Harris County
48201233400	Harris County
48201233500	Harris County
48201233600	Harris County
48201233701	Harris County
48201233702	Harris County
48201233703	Harris County
48201240100	Harris County
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48201240502	Harris County
48201240600	Harris County
48201240701	Harris County
48201240702	Harris County
48201240801	Harris County
48201241000	Harris County
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48201252301	Harris County
48201252400	Harris County
48201252500	Harris County
48201252600	Harris County
48201252700	Harris County
48201252800	Harris County
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48201451001	Harris County
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48201452201	Harris County
48201452300	Harris County
48201452400	Harris County
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48201452600	Harris County
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48201453401	Harris County
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48201520602	Harris County
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48201253700	Harris County
48201253900	Harris County
48201254100	Harris County
48201254200	Harris County
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48201312400	Harris County
48201312800	Harris County
48201313300	Harris County
48201313400	Harris County
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48201521400	Harris County
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48201521600	Harris County
48201521700	Harris County
48201522000	Harris County
48201522100	Harris County
48201522201	Harris County
48201522202	Harris County
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48201532800	Harris County
48201532900	Harris County
48201533000	Harris County
48201533100	Harris County
48201533200	Harris County
48201533300	Harris County
48201533400	Harris County
48201533500	Harris County

48201533600	Harris County
48201533701	Harris County
48201533702	Harris County
48201533801	Harris County
48201533802	Harris County
48201533901	Harris County
48201533902	Harris County
48201534001	Harris County
48201534002	Harris County
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48201540200	Harris County
48201540501	Harris County
48201541300	Harris County
48201541602	Harris County
48201550100	Harris County
48201550200	Harris County
48201550301	Harris County
48201550302	Harris County
48201550401	Harris County
48201550402	Harris County
48201550500	Harris County
48201550601	Harris County
48201550602	Harris County
48201550603	Harris County
48201550700	Harris County
48201550800	Harris County
48201550900	Harris County
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48201552500	Harris County
48201552601	Harris County
48201553002	Harris County
48201553200	Harris County
48201553300	Harris County
48201555501	Harris County
48201980000	Harris County

48201980100	Harris County
48291700100	Liberty County
48291700200	Liberty County
48291700300	Liberty County
48291700400	Liberty County
48291700600	Liberty County
48291701200	Liberty County
48291701400	Liberty County
48321730100	Matagorda County
48321730201	Matagorda County
48321730202	Matagorda County
48321730301	Matagorda County
48321730302	Matagorda County
48321730303	Matagorda County
48321730400	Matagorda County
48321730501	Matagorda County
48321730600	Matagorda County
48471790101	Walker County
48471790200	Walker County
48471790600	Walker County
48471790700	Walker County
48473680200	Waller County
48473680400	Waller County
48473680500	Waller County
48481740200	Wharton County
48481740300	Wharton County
48481740500	Wharton County
48481740700	Wharton County
48481740800	Wharton County
48481741000	Wharton County

This list contains additional census block groups that are identified as disadvantaged by the EPA IRA criteria that are not identified as disadvantaged by the CEJST tool. The EPA IRA disadvantaged community data was downloaded from the EPA[5]:

List of Additional Disadvantaged Communities within the Houston Region by Census Block Group Identified by EPA IRA Criteria

Census Block Group ID	Census Block Group ID	Census Block Group ID
480396605011	480396630003	481576720031
480396605031	480396632002	481576720042
480396606112	480396633001	481576720043
480396606131	480396633002	481576721002
480396607052	480396634002	481576726021
480396607071	480396635004	481576726024
480396609011	480396637001	481576720031
480396609012	480396638001	481576720042
480396609021	480396638003	481576720043
480396610004	480396638004	481576721002
480396611001	480396639001	481576726021
480396611002	480396639002	481576726024
480396614004	480396640001	481576727021
480396614005	480396640003	481576728022
480396615011	480717102023	481576731095
480396615012	480717104014	481576731132
480396615013	481576708011	481576739021
480396615021	481576708012	481576739031
480396616022	481576708031	481576739043
480396617003	481576708032	481576740022
480396619012	481576709021	481576745062
480396620002	481576711021	481576754021
480396621001	481576711022	481576756003
480396623002	481576711023	481576757011
480396623003	481576711024	481677201002
480396624001	481576712001	481677205101
480396626003	481576712002	481677207011

[5] https://gaftp.epa.gov/EPA_IRA_Public/.

481677201002	482012330032	482012522012
481677205101	482012408021	482012522013
481677207011	482012408022	482012522021
481677207013	482012409044	482012522022
481677209001	482012409062	482012522023
481677212073	482012411012	482012523051
481677213012	482012411032	482012523053
481677214021	482012411042	482012523054
481677220021	482012411043	482012523061
481677221001	482012411044	482012523062
481677221003	482012411051	482012523063
481677221004	482012411052	482012532021
481677221005	482012411053	482012532022
481677231002	482012412012	482012532023
481677234011	482012412021	482012532024
481677234012	482012412022	482012533001
481677235032	482012501011	482012538001
481677242002	482012501013	482012538002
481677243001	482012501021	482012538003
481677243002	482012502011	482012538004
481677249001	482012502013	482012540001
481677256004	482012502014	482012547001
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482012322011	482012503031	482013103003
482012322012	482012503042	482013103005
482012322021	482012503043	482013103006
482012323051	482012503053	482013126031
482012323052	482012504031	482013126032
482012323053	482012504032	482013129011
482012323061	482012507012	482013129012
482012323062	482012511005	482013130002
482012323063	482012516003	482013130003
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482012324042	482012517012	482013140012
482012324043	482012517022	482013143011
482012324051	482012519031	482013143021
482012330031	482012520022	482013214021

482013214022	482013401021	482014129022
482013214023	482013405011	482014201002
482013217001	482013405021	482014201003
482013217002	482013405022	482014204003
482013232001	482013405023	482014218011
482013232002	482013407012	482014232011
482013232003	482013409001	482014232012
482013232004	482013409002	482014233012
482013237011	482013409003	482014233013
482013237021	482013409004	482014234011
482013237022	482013411011	482014234013
482013238011	482013411021	482014234014
482013238012	482013413032	482014234021
482013240001	482013413042	482014236001
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482013306002	482013424002	482014311022
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482013306004	482013427001	482014312052
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482013340021	482013501011	482014508012
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482013340033	482013501042	482014513011
482013340034	482013504003	482014515011
482013341021	482013504004	482014516062
482013341022	482013506032	482014517001
482013341023	482013508014	482014517003
482013401011	482013508031	482014518001

482014518002	482015312001	482015421053
482014518003	482015315003	482015421063
482014519021	482015323011	482015421083
482014519032	482015323012	482015422022
482014519033	482015323021	482015422031
482014519034	482015323022	482015422032
482014519042	482015324001	482015423023
482014519043	482015324003	482015423032
482014520011	482015324004	482015423041
482014520022	482015341012	482015424012
482014521011	482015341022	482015424013
482014521013	482015401021	482015424023
482014522022	482015401023	482015424024
482014522023	482015406024	482015428003
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482014542002	482015408001	482015430092
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482014543032	482015408004	482015430111
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482014543043	482015410052	482015515011
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482015116003	482015417012	482015522002
482015116004	482015417013	482015524011
482015202002	482015417033	482015524012
482015218001	482015418011	482015524022
482015218002	482015418022	482015526024
482015219002	482015420012	482015527013
482015219004	482015420032	482015527022
482015224013	482015421042	482015527023
482015224014	482015421051	482015529011

482015529022	483396924012	483396904071
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482015538042	483396926041	483396916022
482015541042	483396926042	483396918012
482015548051	483396926052	483396918023
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482917010003	484717905002	483396923023
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482917011003	484717908004	
482917013003	484717908005	
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483396901023	484736803011	
483396901024	484817404003	
483396902061	483396924012	