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**CPRG IMPLEMENTATION GRANTS COMPETITION  
COVER PAGE FOR APPLICATION**

**APPLICANT INFORMATION**

**Organization**

**Primary Contact Name**

**Phone Number**

**Email Address**

**TYPE OF APPLICATION**                      Individual Applicant                      Lead Applicant for a Coalition

*If lead applicant for a coalition, provide a list of the coalition members below.*

**FUNDING REQUESTED:** *Provide total EPA CPRG Implementation Grant funding requested.*

**APPLICATION TITLE:** *Provide the title of your proposed project.*

**BRIEF DESCRIPTION OF GHG MEASURES:** *Describe each GHG reduction measure contained in the application (1-2 sentences each).*

**SECTORS:** *Identify the sector(s) associated with the GHG reduction measures included in the application.*

Industry	Commercial and Residential Buildings
Electricity Generation	Agriculture/Natural and Working Lands
Transportation	Waste and Materials Management
Other (please describe)	

**EXPECTED TOTAL CUMULATIVE GHG EMISSION REDUCTIONS**

*For all proposed measures combined, provide the estimated cumulative GHG reductions:*

**Estimated cumulative GHG reductions for 2025-2030 (in metric tons)**

**Estimated cumulative GHG reductions from 2025-2050 (in metric tons)**

**LOCATIONS:** *List the primary location(s) where the proposed measures will be implemented*

**City**

**State; Territory; Federally recognized Tribe**

**APPLICABLE PRIORITY CLIMATE ACTION PLAN(S) (PCAP) ON WHICH MEASURES ARE BASED**

**PCAP Lead Organization(s):**

**PCAP Title(s):**

**PCAP Website link(s) (if applicable):**

**List of GHG reduction measures and PCAP page reference for each measure:**

# HOUSTON-GALVESTON AREA COUNCIL REGIONAL COALITION WORKPLAN FOR THE CLIMATE POLLUTION REDUCTION GRANT (CPRG) PHASE II IMPLEMENTATION GRANT

## 1. OVERALL PROJECT SUMMARY AND APPROACH

The Texas Gulf Coast region faces significant environmental challenges due to a combination of urbanization, industrial activity, and natural factors. The Houston area is the epicenter of the oil and gas industry, known globally as the energy capital of the world. To the over 7 million residents who call this region their home, this global position has brought enormous gains to the region's economy, its population, as well as its pollution burden. Action to reduce climate pollution in this region will simultaneously improve the quality of life for millions of residents and serve as a useful example of how a region at the forefront of the energy industry can reduce its climate impact while preserving its regional, national, and global relevance. Mitigating greenhouse gas emissions safeguards the health and well-being of our community and preserves natural resources while fostering a more equitable future for all. Addressing these environmental challenges requires a regionally coordinated effort. The Houston-Galveston Area Council (H-GAC) is one of the largest regional planning commissions in the country and will lead a regional coalition to pursue an Environmental Protection Agency (EPA) Climate Pollution Reduction Implementation Grant. Our regional coalition includes the City of Houston, Fort Bend County, Harris County, Harris County Flood Control District, Port Houston, the Houston Advanced Research Center as technical strategy coordinator, and H-GAC as coalition lead. The reduction measures included in this grant application were carefully selected to advance strategies identified in the region's Priority Climate Action Plan (PCAP). The suite of actions described below maximize climate pollution reduction from industries, government agencies, and businesses. This grant application represents a commitment to collaboration and coordination among seven implementing organizations working together to pursue a more sustainable future for everyone. The EPA describes the funding opportunities in the Inflation Reduction Act as once-in-a-generation; the coalition lead by H-GAC has endeavored to provide the region with a truly transformative and wide-reaching portfolio of projects to rise to the occasion.

### a. DESCRIPTION OF GHG REDUCTION MEASURES

With a total of 13 GHG reduction measures, this application seeks a diverse array of reductions in several geographic areas, with multiple implementers. To best describe and categorize the measures, they are presented by implementation type: industry, government agencies, and business. Collectively, these measures represent a comprehensive strategy to address climate pollution at the local level while contributing to broader regional and national climate goals. The alignment of each reduction measure directly coincides with measures identified in H-GAC's PCAP, as noted below. The key GHG reduction measures include:

**Industry Measures** - Sustainable action within the industrial sector is essential for mitigating climate change and achieving GHG emission reduction targets. By adopting cleaner technologies, improving energy efficiency, and embracing sustainable practices, industry can play a significant role in transitioning to a low-carbon economy and combating climate change. Port Houston was the 1<sup>st</sup> ranked U.S. port in total foreign and domestic waterborne tonnage in 2021, and accounts for nearly 20% of Texas GDP. Port Houston will lead the following projects to reduce greenhouse gas emissions and improve sustainability with three key industrial sector measures which align with strategy E3 from the PCAP.

- Port Houston's High Voltage Shore Power (HVSC) project aims to implement an international standard for container ships, providing 6,600 volts/7.5 MVA shore power to reduce emissions and noise pollution. The project involves installing high voltage plugs, conduits, vaults, transformers, cables, and switchboards at Bayport and Barbour's Cut Terminals.
- Port Houston aims to procure Zero Emission cargo handling equipment (CHE) such as rubber-tired gantry cranes, terminal tractors, and forklifts, along with mobile charging and fueling stations. This initiative addresses emissions generated near workers and communities, enhancing health and sustainability. The Port plans to transition its inventory of hundreds of CHE to Zero Emission by 2050.
- Port Houston plans to address future electric supply challenges by implementing a hydrogen microgrid to support expansion and sustainability efforts. High voltage power is crucial to support ship-to-shore cranes and shore power, with significant electricity demand. This project will advance efforts to decarbonize Port Houston and support a dramatic shift away from fossil fuel technologies to low or zero emission sources.

While implementing GHG reduction strategies in the industrial sector can yield significant environmental benefits, there are also associated risks that need to be addressed like cost overruns or operational disruptions. This risk can be mitigated through proactive risk management, continual monitoring, involving relevant stakeholders early and thorough financial planning before initiating the projects.

**Government Agency Measures** - The involvement of government agencies at the local level is crucial to reducing GHG emissions mitigating climate change impacts, fostering economic development, enhancing energy security, protecting the environment, and demonstrating leadership and responsibility. Most often, local governments agencies bear the brunt of climate-related concerns from their residents and associated costs. Consequently, the H-GAC coalition consists of four local government agencies which are project implementors in this grant application. Those five projects will advance PCAP strategies under the buildings, energy, agriculture, and materials management sectors.

#### Harris County Implementation Projects:

- The Clear Creek Regional Mitigation Bank project aims to preserve a 329-acre site along Chigger Creek in Brazoria County near Alvin for wetland mitigation and floodplain preservation. The site will be transitioned into a native forested and herbaceous wetland mitigation bank. This transition will involve invasive species control, tree planting, forest management, and the restoration of natural hydrology. The project will restore and enhance riverine forested wetlands, promoting carbon sequestration and greenhouse gas reduction. This project directly tracks to the AU2 measure in the PCAP, working with municipal partners to restore degraded lands.
- The Clean Air Renewable Energy & Storage (CARES) project enhances air quality monitoring by integrating solar and battery storage with existing ozone and community air monitoring systems. This ensures continuous operation during grid outages and utilizes excess solar power for building use or grid contribution on clear days. By providing uninterrupted access to air quality data, the project reduces exposure to hazardous air pollution, benefiting public health and safety in LIDAC communities. CARES aligns with the PCAP measure E1, providing funding to incorporate solar and energy storage at public facilities.

#### Fort Bend County Implementation Projects:

- The Building Infrastructure program will improve building efficiency through energy audits, weatherization, electrification, and efficiency programs for municipal buildings. The program will be coordinated from the Fort Bend County offices in collaboration with utilities and community-based organizations. CPRG funding is sought to incentivize efficiency upgrades and promote weatherization, especially for commercial and county buildings. These activities align closely to the B3 measure, providing financial support to weatherize public buildings.

#### City of Houston Implementation Projects:

- The City of Houston aims to enhance community resilience and reduce greenhouse gas emissions through the development of solar and storage microgrids and energy efficiency improvements in municipal buildings. These buildings serve as critical assets during extreme weather events and social crises, providing essential services to Houstonians. PCAP measure E1 outlines intentions to fund solar and energy storage at public facilities.
- The Municipal Fleet Electrification project aims to increase the adoption of electric vehicles (EVs) and expand EV charging infrastructure. This involves deploying Electric Vehicle Support Equipment (EVSE) at City-owned facilities and transitioning municipal government fleet vehicles to EVs. The project will expand EVSE availability in LIDAC neighborhoods lacking access. Fleet electrification maps onto PCAP measure T4, providing financial assistance for EVSE installation in low-income communities.
- The City of Houston aims to reduce waste sent to landfills and greenhouse gas emissions through its expanded Repair Café program. By offering Houstonians greater access to repair household items and appliances, the program aims to decrease unnecessary consumption and landfill waste. Currently offered a limited number of times per year, the program will be expanded with CPRG funding. PCAP measure MM1, promotes recycling, reuse, and waste reduction programs.
- The Brownfields to Brightfields project aims to convert brownfields and landfills into community solar farms, generating carbon pollution-free electricity (CFE) while addressing environmental justice, urban revitalization, and climate change. This project contributes to reducing air pollution and improving air quality in the region. This project aligns both to the PCAP AU2 measure, restoring degraded lands to increase carbon storage, and the E1 measure, funding solar and energy storage at public facilities.

#### Houston Advanced Research Center Implementation Project:

- The ForUsTree project is a collaborative effort to increase tree canopy equity, community resilience, and access to green careers. It expands tree planting and reforestation efforts, prioritizing disadvantaged communities (DACs) to reduce GHG and air pollution while promoting workforce development. ForUsTrees aligns with AU4 measure from the PCAP, supporting partners with expanding urban tree planting programs in disadvantaged communities.

One of the primary risks that could lead to delays or interruptions in the development or implementation of GHG reduction measures led by government agencies is community opposition to proposed GHG reduction measures. Public opinion may be divided on proposals that construct renewable energy facilities or fund green infrastructure projects; this can hinder project development and implementation. In such cases, local government agencies may need to engage in additional outreach and stakeholder consultation to address community concerns and mitigate opposition.

**Business Measures** - Businesses have a significant environmental footprint. Reducing GHG emissions made in this sector can preserve the environment for future generations while simultaneously demonstrating corporate responsibility, which may improve competitiveness. These offer tangible benefits such as cost savings, employee satisfaction and talent acquisition, job creation, and economic development opportunities. The Houston-Galveston Area Council is proposing to implement two projects aimed at generating GHG reductions from small businesses across the full 13 county service area. These activities would align with PCAP strategies in the transportation and buildings sector.

- H-GAC's Small Business Commute Solutions Program proposes the development of a transportation demand management program with incentives focused on assisting small businesses in LIDAC communities access the best transportation options. These communities often lack resources to develop their own programs or offer commuter benefits to employees, such as transit passes. By offering personalized transportation plans and special pricing options to facilitate employee access to transportation services, the project aims to improve job access, spur economic development, and reduce greenhouse gas emissions. This project aligns with T1 measure from the PCAP, providing incentives for regional small businesses to incorporate commute reduction programs.
- The H-GAC Regional Small Business Energy Efficiency Loan program offers financial and technical support to small businesses in Texas to implement clean energy measures in their commercial buildings. By investing in improvements such as better insulation, efficient HVAC systems, electric vehicles, and solar panels, businesses can cut energy costs by up to 40%, improve air quality, and lower greenhouse gas emissions. The Clean Energy Fund aligns with PCAP measure B2, working with small businesses to finance energy efficiency solutions.

One of the primary risks that could lead to delays in the development or implementation of GHG reduction measures for small business is budgetary constraints faced by local government agencies. Insufficient funding may hinder the execution of planned initiatives. This risk can be mitigated by State and Federal grant award. This further underscores the need for opportunities such as the CPRG phase II implementation grant for our region.

#### b. DEMONSTRATION OF FUNDING NEED

The successful implementation of the proposed GHG reduction measures requires substantial financial investment. While our organization and partners are committed to contributing resources towards these initiatives, the scale and scope of the projects necessitate additional funding to fully realize their potential. This subsection outlines the critical need for funding from the EPA's Climate Pollution Reduction Grants Program to support the comprehensive execution of the proposed measures. The requested funding from the EPA's Climate Pollution Reduction Grants Program will bridge the financial gap, enabling the full implementation of these measures. The investment will catalyze long-term environmental, economic, and social benefits, including reduced GHG emissions, improved air quality, job creation, and enhanced resilience to climate change. The transformative impact of these projects, as detailed in the next subsection, further underscores the critical need for funding support.

**Zero Emission Transportation at Port Houston:** Transitioning to zero-emission cargo handling equipment is a major undertaking, with an estimated investment of \$20 million per wharf for shore power infrastructure alone. Additionally, replacing diesel-powered cranes, forklifts, and terminal tractors with electric or hydrogen-powered alternatives involves a cost premium of 1.5 to 2 times

compared to conventional equipment. This significant financial commitment is essential to reduce emissions from port operations and support the transition to cleaner transportation methods.

**Renewable Energy Installations:** The Clean Air Renewable Energy & Storage (CARES) project and the Brownfields to Brightfields initiative are ambitious endeavors that require millions of dollars in investment. For example, the CARES project involves installing solar panels and battery storage systems on county-owned facilities and air quality monitoring stations. Similarly, the Brownfields to Brightfields initiative aims to develop community solar projects on remediated brownfield sites, necessitating substantial investment for site preparation, solar panel installation, and grid integration.

**Building Sector Weatherization and Energy Efficiency:** Expanding the weatherization program to more buildings in Fort Bend County requires additional funding for energy audits, materials, and labor. The program's budget needs to be augmented to accommodate the increased scope and ensure that energy efficiency measures are implemented effectively, leading to reduced energy consumption and GHG emissions.

**Waste Reduction and Material Management:** Scaling up the Houston Repair Café program entails logistical costs, procurement of tools and equipment, and community outreach efforts. Establishing more repair stations and hosting regular events require additional funding to promote a culture of repair and reuse, thereby reducing waste and associated GHG emissions.

**Community Engagement and Equity Considerations:** Ensuring that the benefits of GHG reduction measures reach low-income and disadvantaged communities involves costs associated with targeted outreach, education, and inclusion efforts. Additional resources are required to develop and execute community engagement strategies that prioritize environmental justice.

**Community Tree Planting Project:** The ForUsTrees project requires additional funding to expand tree planting and reforestation efforts, enhance community engagement, and support workforce development. Despite partial funding from the U.S. Department of Agriculture's Forest Service, significant investment is needed for tree procurement, materials, labor, outreach activities, and training programs. The requested funding from the Climate Pollution Reduction Grants Program is essential to fully realize the project's goals of increasing tree canopy equity, improving air quality, reducing GHG emissions, and providing green career opportunities in disadvantaged communities.

The proposed projects represent a crucial investment in our collective future, aiming to implement a comprehensive suite of greenhouse gas (GHG) reduction measures across building, energy, waste management, and transportation sectors. Expanding weatherization programs, integrating solar power and battery storage solutions, enhancing waste reduction initiatives, transitioning to zero-emission transportation, and increasing tree planting efforts require substantial financial support. The additional funding sought from the EPA's Climate Pollution Reduction Grants Program is vital to bridge the financial gap and fully realize the project's potential. With this investment, we can catalyze long-term environmental, economic, and social benefits, including significant GHG emissions reductions, improved air quality, job creation, and enhanced resilience to climate change.

### C. TRANSFORMATIVE IMPACT

The proposed GHG reduction measures are poised to have a transformative impact on our community and beyond. By addressing key sources of emissions across various sectors, these initiatives will not only contribute to significant reductions in greenhouse gases but also bring about lasting positive changes in environmental quality, public health, and economic development. The transformative impact of the proposed GHG reduction measures extends beyond mere emissions reductions. It encompasses a holistic approach to sustainable development, fostering environmental, economic, and social benefits that will resonate for generations to come. The support from the EPA's Climate Pollution Reduction Grants Program is essential in realizing this vision and setting a precedent for comprehensive climate action.

**Environmental Benefits:** The implementation of zero-emission transportation at Port Houston, renewable energy installations, building weatherization, and waste reduction initiatives will collectively lead to a substantial decrease in GHG emissions. This will directly contribute to the mitigation of climate change and improve local air quality, reducing the incidence of pollution-related health issues such as respiratory diseases and heart conditions. Additionally, the Port Houston projects serve as replicable examples of electrification and grid enhancements that can be implemented at other seaports throughout the country, offering an important proof of concept. In 2019, Port Houston's emissions accounted for 6% of the region's total emissions, underscoring the potential impact of transitioning to low-carbon energy sources in a traditionally hard-to-abate sector. The tree planting project will enhance air quality and reduce GHG emissions through expanded tree planting and reforestation efforts.

**Economic Development:** The transition to cleaner technologies and practices will stimulate economic growth by creating new job opportunities in renewable energy, energy efficiency, and waste management sectors. The investment in zero-emission cargo handling equipment and shore power infrastructure at Port Houston will position the port as a leader in sustainable operations, attracting more business and fostering innovation in green technologies. Workforce development initiatives within the tree planting project will create green career opportunities, contributing to economic growth in the region. EVSE infrastructure, weatherization, and energy efficiency projects will reduce ongoing operational costs to small businesses and LIDACs.

**Social and Community Impact:** The focus on low-income and disadvantaged communities ensures that the benefits of these GHG reduction measures are equitably distributed. Programs like the Houston Repair Café and community solar projects will directly engage residents, providing them with access to affordable energy, job training opportunities, and a platform for community building. This inclusive approach will enhance social cohesion and empower communities to take an active role in environmental stewardship. By prioritizing disadvantaged communities, the tree planting project will promote environmental equity and foster a more inclusive approach to urban greening.

**Resilience and Adaptation:** By integrating renewable energy and energy efficiency measures, the project will enhance the resilience of critical infrastructure and communities to climate-related disruptions. The weatherization of buildings and the implementation of microgrids will improve energy security and reduce vulnerability to extreme weather events. The increased tree canopy will reinforce community resilience to climate change impacts, such as extreme heat and flooding.

## **2. IMPACT OF GHG REDUCTION MEASURES**

The proposed GHG reduction measures are strategically designed to achieve durable and permanent reductions in greenhouse gas emissions, aligning with national and global climate goals. This section provides a quantitative analysis of the expected impact of these measures, presenting data-driven estimates of GHG reductions over two critical timeframes: the short-term (2025 through 2030), cumulatively accounting for 3,207,675 metric tons of CO<sub>2</sub>e reductions and the long-term (2025 through 2050), cumulatively accounting for 4,848,375 metric tons of CO<sub>2</sub>e reductions. Additionally, it evaluates the cost-effectiveness of the proposed measures, offering insights into the economic efficiency of achieving these reductions. Detailed documentation of the assumptions and methodologies used to calculate GHG reductions is provided, ensuring transparency and accuracy in the impact assessment.

### **a. MAGNITUDE OF GHG REDUCTIONS FROM 2025 THROUGH 2030**

The proposed GHG reduction measures are anticipated to result in significant sustainable cumulative GHG emission reductions from 2025 through 2030. The quantification of these reductions is based on the implementation of each measure and the associated emission reduction potential. Each projected reduction below refers to the reductions expected within the first 5 years of implementation.

#### **Industry Measures:**

- Port Houston's High Voltage Shore Power (HVSC) project is projected to reduce GHG emissions by 124,000 metric tons of CO<sub>2</sub>-equivalent (CO<sub>2</sub>e) from 2025 through 2030.
- Zero Emission Cargo Handling Equipment (CHE) procurement is estimated to reduce 360,000 metric tons of CO<sub>2</sub>e from 2025 through 2030
- Hydrogen MicroGrid Implementation is projected to reduce 86,800 metric tons of CO<sub>2</sub>e from 2025 to 2030.

#### **Government Agency Measures:**

- Clear Creek Regional Mitigation Bank project by Harris County is expected to sequester up to 13,900 metric tons of CO<sub>2</sub>e from 2025 through 2030.
- CARES project by Harris County is anticipated to reduce GHG emissions by 250 metric tons of CO<sub>2</sub>e per successful installation from 2025 through 2030.
- Building Infrastructure program by Fort Bend County aims to reduce GHG emissions by 8,000 metric tons of CO<sub>2</sub>e from 2025 through 2030.
- Solar and Storage Microgrids and Energy Efficiency Improvements by the City of Houston are projected to reduce GHG emissions by 7,500 metric tons of CO<sub>2</sub>e from 2025 through 2030.
- Municipal Fleet Electrification project by the City of Houston is expected to reduce GHG emissions by 3,000 metric tons of CO<sub>2</sub>e from 2025 through 2030.
- Expanded Repair Café program by the City of Houston aims to reduce GHG emissions by 525 metric tons of CO<sub>2</sub>e from 2025 through 2030.
- Brownfields to Brightfields project by the City of Houston is projected to reduce GHG emissions by 272,500 metric tons of CO<sub>2</sub>e from 2025 through 2030.
- ForUsTree project by the Houston Advanced Research Center is anticipated to sequester 1,100 metric tons of CO<sub>2</sub>e from 2025 through 2030.

#### **Business Measures:**

- Small Business Commute Solutions Program by H-GAC is expected to reduce GHG emissions by 2.1 million metric tons of CO<sub>2</sub>e from 2025 through 2030.
- Regional Small Business Energy Efficiency Loan Program by H-GAC aims to reduce GHG emissions by 230,000 metric tons of CO<sub>2</sub>e from 2025 through 2030.

b. MAGNITUDE OF GHG REDUCTIONS FROM 2025 THROUGH 2050

The proposed GHG reduction measures are anticipated to result in significant sustainable cumulative GHG emission reductions from 2025 through 2050. The quantification of these reductions is based on the implementation of each measure and the associated emission reduction potential. Each projected reduction below refers to the reductions expected within the grant horizon of 2050.

**Industry Measures:**

- Port Houston's High Voltage Shore Power (HVSC) project is projected to contribute to a cumulative reduction of 124,000 metric tons of CO<sub>2</sub>e by 2050.
- Zero Emission Cargo Handling Equipment (CHE) procurement is estimated to further reduce GHG emissions by 1,803,000 metric tons of CO<sub>2</sub>e by 2050.
- Hydrogen MicroGrid Implementation aims to contribute to a reduction of 434,000 metric tons of CO<sub>2</sub>e by 2050.

**Government Agency Measures:**

- Clear Creek Regional Mitigation Bank project by Harris County is expected to continue sequestering carbon, contributing to a cumulative reduction of up to 69,500 metric tons of CO<sub>2</sub>e by 2050.
- CARES project by Harris County is anticipated to reduce GHG emissions by 1,250 metric tons of CO<sub>2</sub>e per successful installation project by 2050.
- Building Infrastructure program by Fort Bend County aims to reduce GHG emissions by 40,000 metric tons of CO<sub>2</sub>e by 2050.
- Solar and Storage Microgrids and Energy Efficiency Improvements by the City of Houston are projected to reduce GHG emissions by 35,000 metric tons of CO<sub>2</sub>e by 2050.
- Municipal Fleet Electrification project by the City of Houston is expected to reduce GHG emissions by 15,000 metric tons of CO<sub>2</sub>e by 2050.
- Expanded Repair Café program by the City of Houston aims to reduce GHG emissions by 2,650 metric tons of CO<sub>2</sub>e by 2050.
- Brownfields to Brightfields project by the City of Houston is projected to reduce GHG emissions by 1,362,500 metric tons of CO<sub>2</sub>e by 2050.
- ForUsTree project by the Houston Advanced Research Center is anticipated to sequester 5,500 metric tons of CO<sub>2</sub>e by 2050.

**Business Measures:**

- Small Business Commute Solutions Program by H-GAC is expected to reduce GHG emissions by 6.4 million metric tons of CO<sub>2</sub>e by 2050.
- Regional Small Business Energy Efficiency Loan Program by H-GAC aims to reduce GHG emissions by 460,000 metric tons of CO<sub>2</sub>e by 2050.

c. COST EFFECTIVENESS OF GHG REDUCTIONS

The cost-effectiveness of the proposed GHG reduction measures is evaluated based on the requested CPRG funding required per metric ton of CO<sub>2</sub>e reduced. The cumulative result for the suite of 13 proposed projects is **\$51 per metric ton of CO<sub>2</sub>e reduced from 2025 to 2030**. These measures collectively represent a comprehensive approach to addressing climate change at the local level, with significant reductions in GHG emissions and improvements in air quality, while also addressing broader regional and national climate goals. Each measure is accompanied by a robust monitoring and evaluation plan to track progress and ensure the successful implementation and achievement of desired outcomes.

d. DOCUMENTATION OF GHG REDUCTION ASSUMPTIONS

The technical appendix accompanying the project narrative provides a detailed explanation of the methodology and assumptions used to develop the estimated GHG emission reductions associated with each measure. This documentation is essential for ensuring the transparency and credibility of the GHG reduction estimates. This technical appendix ensures that the estimated GHG emission reductions for each measure are based on a thorough and comprehensive methodology, with clear and reasonable assumptions. It serves as a foundation for the credibility and reliability of the GHG reduction estimates presented in the proposal. Below describes the high-level process detailed in the appendix.

- **GHG Reduction Estimate Method:** For each GHG reduction measure, the methods used to arrive at the activity data or other outputs and the GHG emission reduction estimate are described. This may include engineering estimates, modeling, or existing publicly available tools or calculators.
- **Models/Tools Used:** Specific models or tools used to develop the GHG emission reduction estimate are listed or described. This includes the name of the developer/provider of the model/tool (e.g., EPA) and any other detailed references as appropriate.
- **Measure Implementation Assumptions:** Key assumptions related to the implementation of the GHG reduction measure are provided. This may include data supporting assumed rates of measure implementation, implementation milestones, measure lifetime, capital cost assumptions, and operation and maintenance cost assumptions.
- **GHG Reduction Estimate Assumptions:** Key assumptions used as part of the method for estimating GHG emission reductions are provided. This may include emission rates, emission factors, and input assumptions if modeling is used, such as cost and performance data and energy prices.
- **Reference Case Scenario (GHG Emissions or Activity Level):** The reference scenario used to quantify GHG emission reductions for each measure is described. This may include a reference level of energy efficiency for a type of energy use equipment or GHG emission intensity under standard market practice for a type of activity, application, or equipment.
- **Measure-Specific Activity Data:** Relevant activity data used for estimating GHG emission reductions for each measure is provided. This may include data such as energy savings, electrical output, vehicle miles traveled, units of equipment installed, or other metrics used to track the implementation and/or effects of a GHG reduction measure.
- **GHG Emissions Reduced:** For each GHG reduction measure, measure-specific estimated annual GHG emission reductions (e.g., absolute reduction in metric tons of CO<sub>2</sub> equivalent [mtCO<sub>2</sub>e]) and cumulative GHG emission reductions for the periods 2025 through 2030 and 2025 through 2050 are provided.

### **3. ENVIRONMENTAL RESULTS – OUTPUTS, OUTCOMES, AND PERFORMANCE MEASURES**

The proposed GHG reduction measures are designed to achieve significant environmental results, contributing to the overarching goals of mitigating climate change and improving air quality. This section outlines the expected project outputs and outcomes, detailing the performance measures used to assess progress and impact. Additionally, it provides an overview of the authorities involved in implementation, the timeline for execution, and key milestones that will mark progress toward achieving the project's objectives. By providing a clear framework for measuring and tracking environmental results, this section ensures accountability and transparency in the execution of the proposed GHG reduction measures. The Houston Advance Research Center has a proven track record with analysis and planning, they will be assuming the role of technical strategy coordinator to demonstrate the coalition's commitment to delivering measurable environmental benefits and the capacity to effectively manage and report on the progress of the project.

#### **a. EXPECTED OUTPUTS AND OUTCOMES**

The proposed GHG reduction measures are expected to yield tangible outputs and outcomes that contribute to the overarching goals of mitigating climate change and improving air quality. These outputs and outcomes are aligned with the goals of the EPA's Fiscal Year 2022-2026 Strategic Plan, particularly Goal 1: "Tackle the Climate Crisis" and Objective 1.1: "Reduce Emissions that Cause Climate Change." The measures are designed to aggressively reduce greenhouse gas emissions from all sectors while increasing energy and resource efficiency and the use of renewable energy.

#### **b. PERFORMANCE MEASURES AND PLAN**

To effectively monitor and evaluate the progress and impact of the proposed GHG reduction measures, a comprehensive set of performance measures has been established. These measures, along with a detailed monitoring plan, will ensure accountability and transparency in the implementation of the project. The performance measures and monitoring plan are designed to provide a clear and measurable framework for assessing the effectiveness of the GHG reduction measures. Regular reporting and analysis of the performance data will inform ongoing project management and decision-making, ensuring that the project remains on track to achieve its environmental goals.

The following are the expected outputs, outcomes, and key performance measures for each GHG reduction measures:

#### **Industry Initiatives:**

- **Port Houston High Voltage Shore Power**
  - Outcome: Reduction in greenhouse gas emissions and noise pollution from ships docked at Port Houston.
  - Output: Installation and operation of High Voltage Shore Power infrastructure.
  - Performance Measures: Reduction in diesel fuel consumption, decrease in air pollutants (e.g., NOx, SOx), reduction in noise levels at the port.
- **Port Houston Zero Emission cargo handling equipment (CHE)**
  - Outcome: Reduction in GHG emissions and improvement in air quality.
  - Output: Acquisition and deployment of Zero Emission cargo handling equipment.
  - Performance Measures: Decrease in diesel fuel consumption, reduction in criteria air pollutants (e.g., PM, VOCs), improvement in air quality monitoring data.

- Port Houston Hydrogen MicroGrid Implementation
  - Outcome: Transition towards renewable energy sources and reduction in carbon footprint and GHG emissions of port operations.
  - Output: Development and operation of Hydrogen MicroGrid infrastructure.
  - Performance Measures: Increase in renewable energy generation, decrease in carbon dioxide emissions, improvement in energy efficiency metrics.

**Government Agency Initiatives:**

- Harris County Clear Creek Regional Mitigation Bank Project.
  - Outcome: Preservation of wetlands for biodiversity, flood mitigation, reductions in GHG emissions and carbon sequestration.
  - Output: Establishment and maintenance of wetland preservation site.
  - Performance Measures: Increase in wetland area, improvement in flood mitigation metrics, monitoring of carbon sequestration rates.
- The Harris County CARES project
  - Outcome: Improved air quality, reductions in GHG emissions and reduction in public health risks associated with air pollution.
  - Output: Enhancement of air quality monitoring infrastructure.
  - Performance Measures: Reduction in concentration levels of air pollutants (e.g., ozone, particulate matter), improvement in air quality index ratings, increase in public awareness of air quality issues.
- Fort Bend County weatherization program
  - Outcome: Increase in energy efficiency and reduction in greenhouse gas emissions from buildings.
  - Output: Implementation of energy audits and weatherization measures for buildings.
  - Performance Measures: Reduction in energy consumption, decrease in greenhouse gas emissions, improvement in building energy performance metrics.
- City of Houston solar and storage microgrids
  - Outcome: Increased resilience to power outages, reductions in GHG emissions, and reduction in reliance on fossil fuels for electricity generation.
  - Output: Installation and operation of solar and storage microgrid systems.
  - Performance Measures: Increase in renewable energy generation, decrease in carbon dioxide emissions, improvement in grid reliability metrics.
- The Houston Municipal Fleet Electrification project
  - Outcome: Transition of municipal fleet to electric vehicles, reduction in transportation-related greenhouse gas emissions.
  - Output: Procurement and deployment of electric vehicles and charging infrastructure.
  - Performance Measures: Increase in number of electric vehicles in municipal fleet, reduction in gasoline/diesel consumption, improvement in air quality metrics.
- City of Houston expands Repair Café program
  - Outcome: Reduction in waste generation and greenhouse gas emissions through repair and reuse initiatives.

- Output: Expansion of Repair Café program and promotion of repair culture.
- Performance Measures: Increase in repaired items, decrease in waste generation, improvement in waste diversion rates.
- Houston's Brownfields to Brightfields project
  - Outcome: Remediation of contaminated sites, reductions in GHG emissions, and utilization of land for renewable energy generation.
  - Output: Conversion of brownfields and landfills into solar farm infrastructure.
  - Performance Measures: Increase in renewable energy generation capacity, decrease in contaminated land area, improvement in land remediation metrics.
- The ForUsTree collaborative project
  - Outcome: Increase in tree canopy coverage, improvement in air quality, reductions in GHG emissions, and creation of green jobs in underserved communities.
  - Output: Expansion of tree planting initiatives and workforce development programs.
  - Performance Measures: Increase in tree planting rates, improvement in air quality monitoring data, increase in employment opportunities in green sectors.

#### **Business Initiatives:**

- H-GAC's Small Business Commute Solutions Program
  - Outcome: Reduction in transportation-related GHG emissions and promotion of sustainable commuting options.
  - Output: Development and implementation of transportation demand management program.
  - Performance Measures: Decrease in vehicle miles traveled, increase in use of alternative transportation modes, improvement in commuter satisfaction metrics.
- The Small Businesses Energy Efficiency Loan Program
  - Outcome: Adoption of clean energy technologies and reduction in greenhouse gas emissions by small businesses.
  - Output: Provision of financial assistance and technical support for clean energy projects.
  - Performance Measures: Increase in number of clean energy projects implemented, reduction in energy consumption, improvement in energy efficiency metrics.

#### **C. AUTHORITIES, IMPLEMENTATION TIMELINE, AND MILESTONES**

The successful implementation of the GHG reduction measures requires effective coordination among various authorities and above all else, the authority of implementers to pursue those measures. This subsection lists the implementers of each GHG reduction measure and confirms their authority to implement their respective measures. Major milestones of the CPRG grant at large are listed below, with more detailed project timelines available upon notification of award.

#### **Implementers:**

- **Port Houston:** The identified implementer for the MicroGrid, the High Voltage Shore Power, and Zero Emissions Cargo Handling Equipment projects.
- **Harris County:** Will lead the implementation of the Clean Air Renewable Energy & Storage (CARES) and the Clear Creek Regional Mitigation Bank projects.

- **Fort Bend County:** The identified implementer for the County Infrastructure Weatherization project.
- **City of Houston:** The City of Houston’s responsibility for implementation includes the Decarbonization of Municipal Buildings, the Municipal Fleet Electrification, the Repair Cafe, and the Brownfields to Brightfields projects.
- **H-GAC:** H-GAC, in addition to serving as coalition lead, will implement a Regional Small Business Energy Efficiency Loan program and extend the implementation of our Commute Solutions program to small businesses.
- **HARC:** The identified implementer of the ForUsTrees project.

In recognition of the accelerated nature of the CPRG funding, and a desire to maximize realization of GHG reductions as quickly as possible, this application includes only measures that, by nature, fall within the established authorities of the identified implementers. Care was taken to ensure that our suite of projects remains voluntary and incentive based. This is especially critical given recent legislation in the State of Texas which bars the enactment of disincentives or mandates at a sub-state level.

#### Implementation Timeline and Milestones:

Task #	Milestone	Timeline
<b>1</b>	<b><i>Contract Preparation &amp; Management</i></b>	<b><i>July 2024-October 2024</i></b>
1.1	EPA Notification of Award Recommendation	July 2024
1.2	H-GAC Board of Directors Accepts Contract with EPA	August 2024
1.3	EPA/H-GAC Contract Execution, Authorization to Begin Project	September 2024
1.4	H-GAC Board of Directors Authorizes Contracting Agreements with Partner Municipalities	September 2024
1.5	Official Project Start Date	October 2024
<b>2</b>	<b><i>Bidding and Procurements</i></b>	<b><i>October 2024 – March 2025</i></b>
2.1	Develop MOU with partner organizations	October 2024 – February 2025
2.2	Set contracting timelines and specification	October 2024 – February 2025
2.4	Release bid packages and solicit proposals	February 2025 – March 2025
2.5	Negotiate and finalize contractor agreements	March 2025
2.6	Stakeholder and Community Engagement	October 2024 – March 2025
<b>3</b>	<b><i>Project Initiation</i></b>	<b><i>March 2025 – Fall 2025</i></b>
3.1	Project activation and installation activities	March 2025 – October 2025
3.2	Stakeholder Engagement - Ongoing	March 2025 – October 2025
3.3	Start of construction for shore power projects	March 2025 – May 2025
3.4	Purchase of zero-emission cargo handling equipment	May 2025 – October 2025
3.5	Implementation of building renewable energy installations	May 2025 – October 2025
3.6	Building weatherization and energy efficiency upgrades	March 2025 – October 2025
3.7	Add Additional Repair Café locations	March 2025 – October 2025
3.8	Installation of community solar projects	March 2025 – November 2025
3.9	Begin tree plantings and bank mitigation	March 2025 – October 2025

3.10	Announce energy efficiency loan program	March 2025 – May 2025
3.11	Begin small business solicitation for commute incentive	March 2025 – June 2025
<b>4</b>	<b><i>Monitor and Reporting</i></b>	<b><i>Fall 2025 – Fall 2027</i></b>
4.1	Establish performance measures	October 2025 – November 2026
4.2	Determine data collection method and transparency protocols	December 2025- January 2026
4.3	Begin data collection and analysis - ongoing	October 2025 – September 2027
4.4	Quantified GHG Reduction Measures	October 2025 – September 2027
4.5	Co-Benefits Analysis	October 2025 – September 2027
4.6	Low-Income and Disadvantaged Communities Benefits Analysis	October 2025 – September 2027
4.7	Semi-Annual Reporting to EPA	October 2025 – September 2027
<b>5</b>	<b><i>Project Evaluation and Adjustments</i></b>	<b><i>October 2024 – Fall 2029</i></b>
5.1	Identify areas for improvement or adjustments	January 2025 – Fall 2029
5.2	Implement necessary modifications or enhancements as needed	January 2025 – Fall 2029
5.3	Review Next Steps/Future Budget and Staffing Needs	January 2025 – Fall 2029
5.4	Completion of Final Report to EPA	Winter 2029

#### **4. LOW-INCOME AND DISADVANTAGED COMMUNITIES**

Addressing the needs of low-income and disadvantaged communities and incorporating their input throughout the planning process were central foci of the proposed GHG reduction measures. 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, air quality and health challenges, extreme temperature and health, drought, flooding, and infrastructure damage. This section highlights the coalition’s commitment to ensuring that our suite of projects not only provide environmental improvements to LIDACs but also avoid disbenefits, increase mobility choice, increase access to public spaces, etc. By prioritizing equity and inclusivity, the project aims to create a more sustainable and just future for all members of the community.

##### **a. COMMUNITY BENEFITS**

The proposed GHG reduction measures are designed to deliver significant benefits to low-income and disadvantaged communities, addressing historical environmental and economic disparities. Grant-funded activities will include community engagement and outreach to help residents understand health and safety issues and ensure that concerns are heard, and community goals are reflected in the redevelopment of brownfield sites. The project will take an equity-driven and socially inclusive approach to confirming project locations, planning, and design, ensuring that low-income and disadvantaged communities benefit from the GHG reduction measures.

The following are examples of expected direct and indirect benefits:

- **Mitigating Climate Impacts:** Reduced risk of wildfires, drought, extreme weather events, and sea-level rise, enhancing community resilience to climate change through urban tree planting and the restoration of degraded land and carbon sinks.
- **Improved Public Health:** Reductions in co-pollutants such as NOx, ozone, PM2.5, and HAPs, leading to fewer new asthma cases, reductions in hospital admissions, and emergency department visits.
- **Economic Opportunities:** Creation of high-quality jobs and new workforce training opportunities, and financial support to small businesses to foster energy efficiency, subsequently lowering energy burdens and providing financial benefits.
- **Improved Access to Services and Amenities:** Improved access to transportation alternatives including vanpool, vehicle sharing, and EVSE infrastructure, decreased energy costs and improved energy resilience from the weatherization of public buildings.
- **Environmental Enhancements:** Improved outdoor air quality directly related to port facility electrification, solar and energy storage projects, etc., new green space and community beautification related to land restoration and tree planting.
- **Workforce Development:** High-quality training models such as pre-apprenticeship programs, registered apprenticeship programs, and partnerships with community colleges that award industry-recognized credentials.

The Brownfields to Brightfields initiative, for example, aims to transform brownfields/landfills into community solar farms, providing clean energy and job opportunities in historically underrepresented communities. The City of Houston's focus on energy efficiency and power resilience in disadvantaged communities ensures that resilience is built where it is most needed, and community-serving municipal facilities are used to address energy equity and power resilience.

#### b. COMMUNITY ENGAGEMENT

Meaningful engagement with low-income and disadvantaged communities is a cornerstone of the proposed GHG reduction measures. Grant-funded activities will include community engagement and outreach to help residents understand health and safety issues and ensure that their concerns are heard and community goals continue to be reflected. By fostering early and consistent inclusion of various linguistic, cultural, institutional, geographic, and other perspectives throughout project development and implementation, the project aims to achieve meaningful engagement with low-income and disadvantaged communities. Our partners have already begun meaningful work to engage disadvantaged communities, notably Harris County. As the most populous county in the H-GAC service area, Harris County faces unique climate challenges, compounded by its status as the energy capital of the world and its high concentration of LIDAC communities. The county's 2023 *Climate Justice Framework* engaged nearly 200 participants through multiple in-person and virtual meetings, addressing barriers to participation such as language interpretation, transportation, childcare, and food provision. Feedback that is echoed in this grant application highlighted concerns about ineffective communication by government agencies, limited access to green spaces, disproportionate pollution impacts on LIDAC communities, and improved health outcomes.

H-GAC anticipates a robust procurement process to contract a highly skilled marketing and outreach firm to help form the coalition's engagement strategy. Given the long temporal scale, as well as the

diversity of our region of over 7 million residents, which spans 13 counties, the procurement will be competitive, drawing numerous applicants. The contracted firm will have expertise in environmental educational outreach, a proven track record of incorporating community input, and the bandwidth to engage with the whole of our large region. Given the unique nature of the coalition, H-GAC and the contracted firm will defer to our partners' expertise in engaging their communities. We recognize that some of our partners have developed engagement frameworks, such as Harris County's Climate Justice Framework, while others' expertise in engaging LIDAC communities may be nascent. We are committed to supporting and engaging our entire region.

## **5. JOB QUALITY**

The Houston-Galveston Area Council (H-GAC) is a leading regional planning organization covering 13 counties with over 7 million residents. Our Workforce Solutions team provides job-search resources, career training, and financial assistance to connect people with employment opportunities. We work closely with the Texas Workforce Solutions network to support Texans in finding jobs and prospering in our local economy. The Gulf Coast Workforce Board, overseeing Workforce Solutions, plans and delivers employment services and training across our region. As part of our climate planning efforts, H-GAC collaborates with Workforce Solutions to ensure CPRG implementation generates high-quality jobs. Each of our local government partners are also actively connected to this effort.

Ensuring high job quality is a fundamental aspect of the proposed GHG reduction measures. Additionally, H-GAC recognizes job quality as an especially important consideration of the CPRG program. Our suite of projects demonstrates a commitment to creating high-quality jobs that provide fair wages, safe working conditions, career advancement and pay close attention to inclusivity and diversity of workers. By prioritizing job quality, the project aims to create not only environmentally sustainable outcomes but also socially and economically sustainable opportunities for workers. This approach recognizes that the success of GHG reduction measures depends on the well-being and empowerment of the workforce that implements them.

These programs aim to uphold Good Jobs Principles and mirror H-GAC's commitment to prioritizing fair wages, comprehensive benefits, equitable opportunities, and stable employment for all workers.

## **6. PROGRAMMATIC CAPABILITY AND PAST PERFORMANCE**

The Houston-Galveston Area Council (H-GAC) is a leading regional planning commission spanning 13 counties and encompassing 177 cities and 84 independent school districts. With a 300-member staff and a 37-member board, we tackle regional challenges by facilitating collaboration, prioritizing funding, and providing direct services. Established in 1966, H-GAC serves as a forum for local governments to address common issues, promoting regional cooperation in transportation, air quality, economic development, and more. Our mission is to ensure orderly development and enhance the safety and welfare of citizens in the Texas region.

### **a. PAST PERFORMANCE**

Over the years, the Houston-Galveston Area Council (H-GAC) has demonstrated exceptional competence in managing various federal grants and non-federally funded assistance agreements, ensuring successful implementation and impactful outcomes. Here's a summary of some key projects and their achievements:

- **Safe Streets and Roads for All**
  - Funding Agency: U.S. Department of Transportation (DOT) - Safe Streets and Roads for All (SS4A) grant program
  - Description: H-GAC secured \$4 million to develop a Regional Safety Action Plan aimed at eliminating roadway fatalities and serious injuries in the Houston-Galveston region.
  - Completion: Awarded in 2023
- **Texas GLO Harvey Relief Funding**
  - Funding Agency: Texas General Land Office (GLO)
  - Description: H-GAC managed approximately \$111 million of recovery funds allocated by the Texas GLO to support relief efforts in the aftermath of Hurricane Harvey.
  - Completion: Successfully managed
- **EPA Diesel Emission Reduction Act (DERA) Grant**
  - Assistance Agreement Number: 01F56501
  - Funding Agency: U.S. Environmental Protection Agency (EPA)
  - Description: H-GAC received \$2.1 million from EPA's DERA grant to replace 200 diesel engines, contributing to air quality improvement efforts since 2009.
  - Completion: Successfully managed
- **Community Development Block Grant Mitigation**
  - Assistance Agreement Number: Community Development Block Grant Mitigation
  - Funding Agency: Texas General Land Office (GLO)
  - Description: H-GAC secured \$62,000,200 in Community Development Block Grant Mitigation (CDBG-MIT) funds to support local government projects addressing regional needs identified by H-GAC's Board of Directors.
  - Completion: Application submitted to GLO for approval
- **EPA Regional Climate Action Planning Grant**
  - Funding Agency: U.S. Environmental Protection Agency (EPA)
  - Description: H-GAC received a \$1 million grant from EPA to lead a regional climate action planning effort, aiming to address climate change challenges in the Houston-Galveston region.
  - Completion: Successfully managed

H-GAC's track record reflects its ability to effectively manage federal and state grants, ensuring compliance, accountability, and successful project outcomes. Through strategic planning, meticulous execution, and strong partnerships, H-GAC continues to make significant contributions to regional development and resilience.

b. REPORTING REQUIREMENTS

- H-GAC secured \$4 million to develop a Regional Safety Action Plan to eliminate roadway fatalities and serious injuries in the Houston-Galveston region through the Safe Streets and Roads for All (SS4A) Grant Program. H-GAC consistently met federal reporting requirements by submitting timely interim and final reports documenting progress towards implementing the Regional Safety Action Plan. These reports detailed specific outputs achieved and outcomes realized, ensuring transparency and accountability throughout the grant period.
- H-GAC managed approximately \$111 million in recovery funds allocated by the Texas GLO to support Hurricane Harvey relief efforts. H-GAC demonstrated a strong track record of meeting both federal and state reporting requirements for the Texas GLO Harvey Relief Funding. Interim and final reports were submitted promptly, providing detailed updates on the utilization of funds, progress made in disaster recovery efforts, and outcomes achieved for affected communities.
- H-GAC received \$2.1 million from EPA Diesel Emission Reduction Act (DERA) Grant to replace 200 diesel engines, contributing to air quality improvement efforts since 2009. H-GAC consistently met reporting requirements for the EPA DERA grant, submitting comprehensive interim and final reports detailing progress in diesel engine replacements, emission reductions achieved, and environmental benefits realized.
- H-GAC secured \$62,000,200 in Community Development Block Grant Mitigation (CDBG-MIT) funds to support local government projects addressing regional needs identified by H-GAC's Board of Directors. While the project is ongoing, H-GAC has diligently adhered to reporting requirements by submitting timely progress reports to the Texas GLO. These reports highlight achievements, challenges, and any adjustments made to project plans, ensuring transparency and accountability in the management of CDBG-MIT funds.
- H-GAC received a \$1 million grant from EPA to lead a regional climate action planning effort addressing climate change challenges in the Houston-Galveston region through phase one of the Climate Pollution Reduction Grant. H-GAC consistently met reporting obligations for the CPRG Phase I, providing regular updates on project milestones, stakeholder engagement activities, and progress towards developing and implementing climate action initiatives. Any unexpected delays were communicated promptly in reports, along with new timelines.

In summary, H-GAC has a proven track record of timely meeting federal and state grant reporting requirements across various assistance agreements. Through comprehensive interim and final reports, H-GAC has demonstrated transparency, accountability, and responsiveness in addressing challenges and achieving desired outcomes under each grant.

c. STAFF EXPERTISE

The CPRG Phase II Implementation Grants for GHG reduction measures will be led by a highly skilled team with diverse expertise and extensive experience in environmental sustainability, climate resilience, transportation planning, and project management.

- **Craig Raborn, AICP** - Transportation/MPO Director at H-GAC, has over two decades of experience in regional transportation planning and policy development. His expertise lies in understanding the

impacts of transportation and land use policies on climate and sustainability, making him a key asset in guiding the implementation of transportation-related GHG reduction measures.

- **Andrew J. DeCandis** - Manager of Clean Cities & Clean Vehicles at H-GAC, brings a wealth of experience in sustainability initiatives and data analysis. With a background in science and interdisciplinary work, Andrew is adept at managing and reporting on a wide range of projects focused on environmental and economic sustainability.
- **Pharr Andrews** - AQ Principal Planner at the Houston-Galveston Area Council (H-GAC), brings invaluable experience from developing climate plans for major cities. With a background in environmental policy and project management, Pharr excels in communicating technical information and managing complex programs related to climate protection and air quality.
- **Vincent Polignano** - Environmental professional in H-GAC's Data Analytics & Research department, specializes in travel demand and air quality modeling. Vinny's expertise in modeling ensures that projects conform to air quality goals and regulatory requirements, contributing to effective decision-making in environmental planning.
- **Meredith Jennings, PhD, CC-P** - Senior Program Manager of Clean Energy Policy at H-GAC, is a seasoned professional with expertise in community and climate resilience. With a focus on stakeholder engagement and actionable science, Meredith is dedicated to advancing equitable climate solutions through collaborative efforts.
- **Ebrahim Eslami, PhD** - Research Scientist in Air Quality at the Houston Advanced Research Center (HARC), is an expert in applying machine learning methods to real-world environmental challenges. His skills in data analytics and modeling provide valuable insights for developing effective strategies to reduce air pollution and GHG emissions.
- **Lisa Lin** - Sustainability Officer at Harris County Texas, is leading efforts to implement sustainable transportation options and advance vehicle electrification. With a focus on active transportation and climate action planning, Lisa is instrumental in promoting sustainable practices in Harris County.
- **Thomas Pommier** - Deputy Assistant Director of Resilience and Sustainability at the City of Houston's Mayor's Office, plays a key role in implementing the city's Climate Action Plan and Resilient Houston strategy. With extensive experience in program management and policy development, Thomas leads initiatives to enhance climate resilience and sustainability in Houston.
- **Samantha Gulley** - Project Manager at the Office of the County Judge in Fort Bend County, brings expertise in customer relations and project management. With a track record of success in enhancing workflow processes and meeting critical deadlines, Samantha ensures effective implementation of grant-funded projects.

## 7. BUDGET AND TIMELY EXPENDITURE OF GRANT FUNDS

### a. BUDGET DETAIL

Included below is H-GAC regional coalition's consolidated budget detailing proposed funding expenditures aimed at achieving measurable environmental outcomes and positive community benefits. This budget demonstrates proper management of grant funds to address pressing environmental challenges. We have also included an additional budget spreadsheet with this application that provides details of each project within this grant application. H-GAC is dedicated to responsible stewardship of CPRG Phase II grant funding and the pursuit of impactful, sustainable solutions for our region.

BUDGET BY YEAR	Column1	Column2	Column3	Column4	Column5	Column6	
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	TOTAL PERSONNEL	\$1,660,662	\$2,831,697	\$5,656,361	\$4,136,053	\$2,330,046	\$16,614,819
	TOTAL FRINGE BENEFITS	\$209,841	\$210,338	\$207,776	\$207,629	\$209,545	\$1,045,129
	TOTAL TRAVEL	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
	TOTAL EQUIPMENT	\$100,900	\$499,900	\$10,499,900	\$10,499,900	\$5,400,900	\$27,001,500
	TOTAL SUPPLIES	\$2,876,138	\$2,517,804	\$2,834,471	\$2,584,471	\$2,617,804	\$13,430,689
	TOTAL CONTRACTUAL	\$7,864,968	\$20,789,469	\$34,202,046	\$15,087,597	\$5,097,597	\$83,041,676
	TOTAL OTHER	\$1,501,589	\$12,486,589	\$2,486,589	\$1,986,589	\$1,486,589	\$19,947,944
	TOTAL DIRECT	\$14,216,097	\$39,337,797	\$55,889,143	\$34,504,238	\$17,144,481	\$161,091,756
	TOTAL INDIRECT	\$281,338	\$189,136	\$184,288	\$183,716	\$185,697	\$1,024,175.10
TOTAL FUNDING		\$14,497,435	\$39,526,933	\$56,073,431	\$34,687,954	\$17,330,179	\$162,115,932

BUDGET BY PROJECT			
Project Number	Project Name	Total Cost	% of Total
1	Port Zero Emission cargo handling equipment (CHE)	\$27,297,000	17%
2	Port Houston's High Voltage Shore Power (HVSC)	\$20,000,000	12%
3	Port Houston MicroGrid	\$5,353,825	3%
4	Commute Solution Incentive Project	\$2,406,900	1%
5	Clear Creek Mitigation Bank Project	\$17,500,000	11%
6	Small Business Energy Efficiency Lending Project	\$2,552,694	2%
7	CARES	\$20,456,500	12%
8	Brownfields to Brightfields	\$20,000,000	12%
9	Houston Building Efficiency Project	\$16,500,000	10%
10	Repair Café	\$500,000	0%
11	Houston Fleet Electrification Project	\$13,000,000	8%
12	For Us Trees	\$15,403,772	9%
13	Weatherization Upgrade Project	\$180,000	0%
	Grant Administration	\$3,032,230	2%
Total		\$164,182,921	100%

### b. EXPENDITURE OF AWARDED FUNDS

The Houston-Galveston Area Council (H-GAC) is committed to utilizing the CPRG Phase II grant funding efficiently and effectively to address critical regional GHG reductions. Our approach emphasizes rigorous procedures and controls to ensure timely expenditure and appropriate handling of awarded grant funds. With a professional staff and a long history of successfully managing large, multi-year federal grants, we are well-positioned to execute this budget plan.

Each funded project will be assigned a dedicated project manager responsible for overseeing implementation, monitoring progress, and ensuring compliance with grant requirements. Clear milestones, deliverables, and stringent documentation requirements will be established to track

progress and facilitate accountability. Continuous monitoring and oversight mechanisms will track spending and mitigate risks. Detailed quarterly reports will be prepared and submitted to the EPA, providing a comprehensive overview of grant activities, budget expenditures, accomplishments, and challenges.

H-GAC and our coalition members are dedicated to maximizing the impact of CPRG Phase II grant funding through strategic planning, rigorous procedures, and effective controls. With experienced staff and a commitment to transparency, we are confident in our ability to expend grant funds in a timely and efficient manner while delivering the greatest potential to enhance regional resilience and sustainability benefits.

c. REASONABLENESS OF COSTS

H-GAC is committed to leveraging CPRG Phase II grant funding in a manner that emphasizes the protection of human health and the environment while ensuring reasonable cost-effectiveness. Our approach is designed to maximize the impact of each dollar invested while ensuring that resources are allocated efficiently and transparently. We will strategically allocate grant funds towards ambitious measures to achieve significant GHG reductions by 2030 and beyond, while also striving to deliver substantial community benefits, especially in low-income and disadvantaged communities. Our collaboration with diverse stakeholders, including government agencies, industry, community organizations, and private sector business partners, will be critical in assessing the anticipated environmental benefits and community impacts relative to the projected costs. By fostering these partnerships, we can leverage resources, expertise, and local knowledge to maximize the impact of grant funding.

We are pursuing innovative policies and programs that are replicable and scalable across multiple jurisdictions. By investing in solutions that can be easily replicated in other communities, we maximize the broader impact of grant dollars. In utilizing the grant funds, we will strategically identify opportunities to leverage technology and streamline processes to optimize resource utilization and reduce costs without compromising the quality or effectiveness of our initiatives. H-GAC's regional coalition is committed to ensuring that grant funds are utilized in the most cost-effective manner possible.

Optional Budget Spreadsheet - Consolidated Budget Table

This table will update automatically based on the budget detail entered in the tabs for measures 1-5. If your application includes more than 5 individual measures, you will need to add additional tabs, update the formulas below, and add additional lines to the "Budget by Project" table to include the additional measures.

BUDGET BY YEAR		Column1	Column2	Column3	Column4	Column5	Column6	
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5		TOTAL
Direct Costs	TOTAL PERSONNEL	\$1,660,662	\$2,831,697	\$5,656,361	\$4,136,053	\$2,330,046		\$16,614,819
	TOTAL FRINGE BENEFITS	\$209,841	\$210,338	\$207,776	\$207,629	\$209,545		\$1,045,129
	TOTAL TRAVEL	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000		\$10,000
	TOTAL EQUIPMENT	\$100,900	\$499,900	\$10,499,900	\$10,499,900	\$5,400,900		\$27,001,500
	TOTAL SUPPLIES	\$2,876,138	\$2,517,804	\$2,834,471	\$2,584,471	\$2,617,804		\$13,430,689
	TOTAL CONTRACTUAL	\$7,864,968	\$20,789,469	\$34,202,046	\$15,087,597	\$5,097,597		\$83,041,676
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	TOTAL DIRECT	\$14,216,097	\$39,337,797	\$55,889,143	\$34,504,238	\$17,144,481		\$161,091,756
	TOTAL INDIRECT	\$281,338	\$189,136	\$184,288	\$183,716	\$185,697		\$1,024,175.10
TOTAL FUNDING		\$14,497,435	\$39,526,933	\$56,073,431	\$34,687,954	\$17,330,179		\$162,115,932

BUDGET BY PROJECT			
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6	Small Business Energy Efficiency Lending Project	\$2,552,694	2%
7	CARES	\$20,456,500	12%
8	Brownfields to Brightfields	\$20,000,000	12%
9	Houston Building Efficiency Project	\$16,500,000	10%
10	Repair Café	\$500,000	0%
11	Houston Fleet Electrification Project	\$13,000,000	8%
12	For Us Trees	\$15,403,772	9%
13	Weatherization Upgrade Project	\$180,000	0%
	Grant Administration	\$3,032,230	2%
Total		\$164,182,921	100%

Detailed Budget Table - Port Houston Zero Emission Cargo Handling Equipment Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
							\$0
							\$0
							\$0
	TOTAL PERSONNEL	\$0	\$0	\$0	\$0	\$0	\$0
	Fringe Benefits						
							\$0
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$0	\$0	\$0	\$0	\$0	\$0
	Travel						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
	Hybrid RTG x 5			10000000	10000000	5000000	\$25,000,000
	ZE Yard Tractors 4		350000	350000	350000	350000	\$1,400,000
	ZE Forklifts 10K Lifting Cap 3		90000	90000	90000		\$270,000
	ZE Forklifts 5K Lifting Cap 3		9000	9000	9000		\$27,000
							\$0
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$449,000	\$10,449,000	\$10,449,000	\$5,350,000	\$26,697,000
	Supplies						
							\$0
							\$0
	TOTAL SUPPLIES	\$0	\$0	\$0	\$0	\$0	\$0
	Contractual						
	Charging Stations		200000	200000	200000		\$600,000
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$0	\$200,000	\$200,000	\$200,000	\$0	\$600,000
	OTHER						
							\$0
							\$0
							\$0
	TOTAL OTHER	\$0	\$0	\$0	\$0	\$0	\$0
	TOTAL DIRECT	\$0	\$649,000	\$10,649,000	\$10,649,000	\$5,350,000	\$27,297,000
Indirect Costs	Indirect Costs						
							\$0
							\$0
	TOTAL INDIRECT	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL FUNDING		\$0	\$649,000	\$10,649,000	\$10,649,000	\$5,350,000	\$27,297,000

Detailed Budget Table - Port Houston High Voltage Shore Power Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Cost	Personnel						
		\$0	\$0	\$0	\$0	\$0	\$0
							\$0
							\$0
	TOTAL PERSONNEL	\$0	\$0	\$0	\$0	\$0	\$0
	Fringe Benefits						
		\$0	\$0	\$0	\$0	\$0	\$0
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$0	\$0	\$0	\$0	\$0	\$0
	Travel						
		0	0	0	0	0	\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$0	\$0	\$0	\$0	\$0
	Supplies						
							\$0
							\$0
	TOTAL SUPPLIES	\$0	\$0	\$0	\$0	\$0	\$0
	Contractual						
	Construction Hi-Voltage Shore power		\$10,000,000	\$10,000,000			\$20,000,000
							\$0
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$0	\$10,000,000	\$10,000,000	\$0	\$0	\$20,000,000
	OTHER						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL OTHER	\$0	\$0	\$0	\$0	\$0	\$0
	TOTAL DIRECT	\$0	\$10,000,000	\$10,000,000	\$0	\$0	\$20,000,000
Indirect Cost	Indirect Costs						
							\$0
							\$0
	TOTAL INDIRECT	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL FUNDING		\$0	\$10,000,000	\$10,000,000	\$0	\$0	\$20,000,000

Detailed Budget Table - Port Houston MicroGrid Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
							\$0
							\$0
							\$0
	TOTAL PERSONNEL	\$0	\$0	\$0	\$0	\$0	\$0
	Fringe Benefits						
							\$0
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$0	\$0	\$0	\$0	\$0	\$0
	Travel						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$0	\$0	\$0	\$0	\$0
	Supplies						
							\$0
							\$0
	TOTAL SUPPLIES	\$0	\$0	\$0	\$0	\$0	\$0
	Contractual						
	Microgrid Planning and Installation			\$5,353,825			\$5,353,825
							\$0
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$0	\$0	\$5,353,825	\$0	\$0	\$5,353,825
	OTHER						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL OTHER	\$0	\$0	\$0	\$0	\$0	\$0
	TOTAL DIRECT	\$0	\$0	\$5,353,825	\$0	\$0	\$5,353,825
Indirect Costs	Indirect Costs						
							\$0
							\$0
	TOTAL INDIRECT	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL FUNDING		\$0	\$0	\$5,353,825	\$0	\$0	\$5,353,825

Detailed Budget Table - Small Business Commute Reduction Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
	Senior Coordinator* 50% time	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$200,000
	Coordinator*50% time						\$0
	Marketing Coordinator 10% time	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$50,000
	TOTAL PERSONNEL	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$250,000
	Fringe Benefits						
	Senior Coordinator 48%	\$ 19,200.00	\$ 19,200.00	\$ 19,200.00	\$ 19,200.00	\$ 19,200.00	\$96,000
	Coordinator 48%	\$0	\$0	\$0	\$0	\$0	\$0
	Marketing Coordinator 48%	\$4,800	\$4,800	\$4,800	\$4,800	\$4,800	\$24,000
	TOTAL FRINGE BENEFITS	\$24,000	\$24,000	\$24,000	\$24,000	\$24,000	\$120,000
	Travel						
	Mileage	8400	8400	8400	8400	8400	\$42,000
	5 Trips Monthly, average 70 miles each *2						\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$0	\$0	\$0	\$0	\$0
	Supplies						
							\$0
							\$0
	TOTAL SUPPLIES	\$0	\$0	\$0	\$0	\$0	\$0
	Contractual						
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$0	\$0	\$0	\$0	\$0	\$0
	OTHER						
	incentives (\$175 mo. Yr. 1, 2; 50% each yr. after)	\$210,000	\$210,000	\$105,000	\$105,000	\$105,000	\$735,000
	(cohort 2)	\$0					\$0
	(cohort 3)	0	0				\$0
	(cohort 4)	0	0	0	0	0	\$0
	marketing materials	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
	*Tradeshows and Association Meetings, Ads, print						\$0
	TOTAL OTHER	\$215,000	\$215,000	\$110,000	\$110,000	\$110,000	\$760,000
	TOTAL DIRECT	\$289,000	\$289,000	\$184,000	\$184,000	\$184,000	\$1,130,000
Indirect Costs	Indirect Costs						
	13%	\$326,570.00	\$326,570.00	\$207,920.00	\$207,920.00	\$207,920.00	\$1,276,900
							\$0
	TOTAL INDIRECT	\$326,570	\$326,570	\$207,920	\$207,920	\$207,920	\$1,276,900
TOTAL FUNDING		\$615,570	\$615,570	\$391,920	\$391,920	\$391,920	\$2,406,900

Detailed Budget Table - Clear Creek Bank Mitigation Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
							\$0
							\$0
							\$0
	TOTAL PERSONNEL	\$0	\$0	\$0	\$0	\$0	\$0
	Fringe Benefits						
							\$0
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$0	\$0	\$0	\$0	\$0	\$0
	Travel						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$0	\$0	\$0	\$0	\$0
	Supplies						
							\$0
							\$0
	TOTAL SUPPLIES	\$0	\$0	\$0	\$0	\$0	\$0
	Contractual						
							\$0
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$0	\$0	\$0	\$0	\$0	\$0
	OTHER						
	Engineering, Planting & Forestry Management Plan, Outreach, and Engagement Contract - professional engineering services to complete design of wetland restoration, environmental consulting services for planting and forestry management plan, and communications services for outreach and engagement	\$1,000,000					\$1,000,000
	Construction Management - professional construction management services		\$500,000				\$500,000
	Construction Contact - Construction services		\$10,000,000				\$10,000,000
	Vegetation and Forestry Mgmt Contract - Forestry management services, including planting, maintenance, and invasive species control		\$1,000,000	\$1,000,000			\$2,000,000
	Annual Monitoring Program - Professional environmental consulting services to monitor wetland and vegetation establishment			\$500,000	\$500,000	\$500,000	\$1,500,000
	Adatpive Management Enhancements - Professional engineering, construction, and vegetation management services to adjust project design features and vegetation management features to achieve success criteria		\$500,000	\$500,000	\$1,000,000	\$500,000	\$2,500,000
	TOTAL OTHER	\$1,000,000	\$12,000,000	\$2,000,000	\$1,500,000	\$1,000,000	\$17,500,000
	TOTAL DIRECT	\$1,000,000	\$12,000,000	\$2,000,000	\$1,500,000	\$1,000,000	\$17,500,000
Indirect Costs	Indirect Costs						
							\$0
							\$0
	TOTAL INDIRECT	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL FUNDING		\$1,000,000	\$12,000,000	\$2,000,000	\$1,500,000	\$1,000,000	\$17,500,000

Detailed Budget Table - Small Business Energy Efficiency Loan Program

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
	Business Developer(s), 10hrs a week @35/hr	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600	\$78,000
	Principal Program Coordinator, 5hrs/week @45/hr	\$11,700	\$11,700	\$11,700	\$11,700	\$11,700	\$58,500
	Underwriter , 5hrs/week @25/hr	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500	\$32,500
	Senior Manger 4hrs/week @50/hr	\$10,400	\$10,400	\$10,400	\$10,400	\$10,400	\$10,400
	TOTAL PERSONNEL	\$44,200	\$44,200	\$44,200	\$44,200	\$44,200	\$179,400
	Fringe Benefits						
	Fringe Benefit Rate - 46.27%	\$20,451	\$20,451	\$20,451	\$20,451	\$20,451	\$102,257
							\$0
	TOTAL FRINGE BENEFITS	\$20,451	\$20,451	\$20,451	\$20,451	\$20,451	\$102,257
	Travel						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$0	\$0	\$0	\$0	\$0
	Supplies						
							\$0
							\$0
	TOTAL SUPPLIES	\$0	\$0	\$0	\$0	\$0	\$0
	Contractual						
							\$0
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$0	\$0	\$0	\$0	\$0	\$0
	OTHER						
	Lending Capital	\$440,000	\$440,000	\$440,000	\$440,000	\$440,000	\$2,200,000
							\$0
							\$0
	TOTAL OTHER	\$440,000	\$440,000	\$440,000	\$440,000	\$440,000	\$2,200,000
	TOTAL DIRECT	\$504,651	\$504,651	\$504,651	\$504,651	\$504,651	\$2,523,257
Indirect Costs	Indirect Costs						
	Indirect Costs 13.32%	\$5,887	\$5,887	\$5,887	\$5,887	\$5,887	\$29,437
							\$0
	TOTAL INDIRECT	\$5,887	\$5,887	\$5,887	\$5,887	\$5,887	\$29,437
TOTAL FUNDING		\$510,539	\$510,539	\$510,539	\$510,539	\$510,539	\$2,552,694

Detailed Budget Table - CARES Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
	Project Manager @\$90,000/year; 0.3 FTE	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$150,000
	Compliance Analyst @ \$60,000/year; 0.5 FTE	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$150,000
							\$0
	TOTAL PERSONNEL	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$300,000
	Fringe Benefits						
	35% of Salaries	\$21,000	\$21,000	\$21,000	\$21,000	\$21,000	\$105,000
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$21,000	\$21,000	\$21,000	\$21,000	\$21,000	\$105,000
	Travel						
							\$0
	Mileage for Local Travel (~3000 miles/year @ \$0.65/mile)	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
	Equipment						
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$0	\$0	\$0	\$0	\$0
	Supplies						
							\$0
							\$0
	TOTAL SUPPLIES	\$0	\$0	\$0	\$0	\$0	\$0
	Contractual						
	Contract for 5-7 Solar/Battery Storage projects per year. Assumes average cost \$500,000-\$1,000,000/project site	\$4,750,000	\$4,750,000	\$4,750,000	\$4,750,000		\$19,000,000
	Contract for clean energy apprenticeship/workforce program development and administration	\$250,000	\$250,000	\$250,000	\$250,000		\$1,000,000
							\$0
							\$0
	TOTAL CONTRACTUAL	\$5,000,000	\$5,000,000	\$5,000,000	\$5,000,000	\$0	\$20,000,000
	OTHER						
							\$0
							\$0
							\$0
	TOTAL OTHER	\$0	\$0	\$0	\$0	\$0	\$0
	TOTAL DIRECT	\$5,083,000	\$5,083,000	\$5,083,000	\$5,083,000	\$83,000	\$20,415,000
Indirect Costs	Indirect Costs						
	Indirect costs at 10% of Modified Total Direct Costs	\$8,300.0	\$8,300.0	\$8,300.0	\$8,300.0	\$8,300.0	\$41,500
							\$0
	TOTAL INDIRECT	\$8,300	\$8,300	\$8,300	\$8,300	\$8,300	\$41,500
TOTAL FUNDING		\$5,091,300	\$5,091,300	\$5,091,300	\$5,091,300	\$91,300	\$20,456,500

Detailed Budget Table - Brownfields to Brightfields Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
	Engagement/ Outreach/ Partnership development	\$250,000	\$500,000	\$2,000,000	\$1,500,000	\$750,000	\$5,000,000
							\$0
							\$0
	TOTAL PERSONNEL	\$250,000	\$500,000	\$2,000,000	\$1,500,000	\$750,000	\$5,000,000
	Fringe Benefits						
							\$0
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$0	\$0	\$0	\$0	\$0	\$0
	Travel						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$0	\$0	\$0	\$0	\$0
	Supplies						
							\$0
							\$0
	TOTAL SUPPLIES	\$0	\$0	\$0	\$0	\$0	\$0
	Contractual						
	Design/ Construction	\$750,000	\$1,500,000	\$6,000,000	\$4,500,000	\$2,250,000	\$15,000,000
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$750,000	\$1,500,000	\$6,000,000	\$4,500,000	\$2,250,000	\$15,000,000
	OTHER						
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL OTHER	\$0	\$0	\$0	\$0	\$0	\$0
	TOTAL DIRECT	\$1,000,000	\$2,000,000	\$8,000,000	\$6,000,000	\$3,000,000	\$20,000,000
Indirect Costs	Indirect Costs						
							\$0
							\$0
	TOTAL INDIRECT	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL FUNDING		\$1,000,000	\$2,000,000	\$8,000,000	\$6,000,000	\$3,000,000	\$20,000,000

Detailed Budget Table - City of Houston Solar and Storage Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
	Contractual/Consultant/Engagement Resources	\$690,000	\$1,500,000	\$1,850,000	\$1,150,000	\$580,000	\$5,770,000
							\$0
							\$0
	TOTAL PERSONNEL	\$690,000	\$1,500,000	\$1,850,000	\$1,150,000	\$580,000	\$5,770,000
	Fringe Benefits						
							\$0
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$0	\$0	\$0	\$0	\$0	\$0
	Travel						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$0	\$0	\$0	\$0	\$0
	Supplies						
							\$0
							\$0
	TOTAL SUPPLIES	\$0	\$0	\$0	\$0	\$0	\$0
	Contractual						
	Design/ Construction/ Installation	\$1,290,000	\$2,790,000	\$3,430,000	\$2,150,000	\$1,070,000	\$10,730,000
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$1,290,000	\$2,790,000	\$3,430,000	\$2,150,000	\$1,070,000	\$10,730,000
	OTHER						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL OTHER	\$0	\$0	\$0	\$0	\$0	\$0
	TOTAL DIRECT	\$1,980,000	\$4,290,000	\$5,280,000	\$3,300,000	\$1,650,000	\$16,500,000
Indirect Costs	Indirect Costs						
							\$0
							\$0
	TOTAL INDIRECT	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL FUNDING		\$1,980,000	\$4,290,000	\$5,280,000	\$3,300,000	\$1,650,000	\$16,500,000

Detailed Budget Table - City of Houston Repair Café Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
	Contractual/ Consultant/ Engagement Resources	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$250,000
							\$0
							\$0
	TOTAL PERSONNEL	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$250,000
	Fringe Benefits						
							\$0
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$0	\$0	\$0	\$0	\$0	\$0
	Travel						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
		\$25,000	\$25,000.00	\$25,000.00	\$25,000.00	\$25,000.00	\$125,000
							\$0
	TOTAL EQUIPMENT	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$125,000
	Supplies						
		\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$125,000
							\$0
	TOTAL SUPPLIES	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$125,000
	Contractual						
	Design/ Construction/ Installation						\$0
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$0	\$0	\$0	\$0	\$0	\$0
	OTHER						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL OTHER	\$0	\$0	\$0	\$0	\$0	\$0
	TOTAL DIRECT	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$500,000
Indirect Costs	Indirect Costs						
							\$0
							\$0
	TOTAL INDIRECT	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL FUNDING		\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$500,000

Detailed Budget Table - Houston Fleet Electrification Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
	Contractual/ Consultant/ Engagement Resources	\$160,000	\$320,000	\$1,300,000	\$980,000	\$490,000	\$3,250,000
							\$0
							\$0
	TOTAL PERSONNEL	\$160,000	\$320,000	\$1,300,000	\$980,000	\$490,000	\$3,250,000
	Fringe Benefits						
							\$0
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$0	\$0	\$0	\$0	\$0	\$0
	Travel						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$0	\$0	\$0	\$0	\$0
	Supplies						
							\$0
							\$0
	TOTAL SUPPLIES	\$0	\$0	\$0	\$0	\$0	\$0
	Contractual						
	Design/ Construction/ Installation	\$490,000	\$980,000	\$3,900,000	\$2,920,000	\$1,460,000	\$9,750,000
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$490,000	\$980,000	\$3,900,000	\$2,920,000	\$1,460,000	\$9,750,000
	OTHER						
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL OTHER	\$0	\$0	\$0	\$0	\$0	\$0
	TOTAL DIRECT	\$650,000	\$1,300,000	\$5,200,000	\$3,900,000	\$1,950,000	\$13,000,000
Indirect Costs	Indirect Costs						
							\$0
							\$0
	TOTAL INDIRECT	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL FUNDING		\$650,000	\$1,300,000	\$5,200,000	\$3,900,000	\$1,950,000	\$13,000,000

Detailed Budget Table - For Us Tree Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
	Includes 3% COLA	\$149,688	\$150,724	\$145,387	\$145,079	\$149,072	\$739,951
							\$0
							\$0
	TOTAL PERSONNEL	\$149,688	\$150,724	\$145,387	\$145,079	\$149,072	\$739,951
	Fringe Benefits						
	Calculated at 48% of personnel cost	\$71,850	\$72,347	\$69,786	\$69,638	\$71,555	\$355,176
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$71,850	\$72,347	\$69,786	\$69,638	\$71,555	\$355,176
	Travel						
	Mileage for travel to community engagement meetings	\$4,020	\$4,020	\$4,020	\$4,020	\$1,849	\$17,929
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$4,020	\$4,020	\$4,020	\$4,020	\$1,849	\$17,929
	Equipment						
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$0	\$0	\$0	\$0	\$0
	Supplies						
	Native/Fruit Trees	\$25,900	\$25,900	\$25,900	\$25,900	\$25,900	\$129,500
	Signage				\$12,160		\$12,160
	TOTAL SUPPLIES	\$25,900	\$25,900	\$25,900	\$38,060	\$25,900	\$141,660
	Contractual						
	Subawards	\$2,801,138	\$2,492,804	\$2,809,471	\$2,559,471	\$2,592,804	\$13,255,689
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$2,801,138	\$2,492,804	\$2,809,471	\$2,559,471	\$2,592,804	\$13,255,689
	OTHER						
	IT & Facilities Fee (\$6/hour)	\$19,968	\$19,469	\$18,221	\$17,597	\$17,597	\$92,851
							\$0
							\$0
	TOTAL OTHER	\$19,968	\$19,469	\$18,221	\$17,597	\$17,597	\$92,851
	TOTAL DIRECT	\$3,072,564	\$2,765,264	\$3,072,785	\$2,833,865	\$2,858,777	\$14,603,256

Indirect Costs	Indirect Costs						
	Rate is 53%	\$236,606	\$144,404	\$139,556	\$138,984	\$140,966	\$800,516
							\$0
	TOTAL INDIRECT	\$236,606	\$144,404	\$139,556	\$138,984	\$140,966	\$800,516

TOTAL FUNDING		\$3,309,170	\$2,909,668	\$3,212,341	\$2,972,849	\$2,999,743	\$15,403,772
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Detailed Budget Table - Fort Bend County Weatherization Project

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
		\$50,000					\$50,000
							\$0
							\$0
	TOTAL PERSONNEL	\$50,000	\$0	\$0	\$0	\$0	\$50,000
	Fringe Benefits						
							\$0
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$0	\$0	\$0	\$0	\$0	\$0
	Travel						
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
		\$50,000					\$50,000
							\$0
	TOTAL EQUIPMENT	\$50,000	\$0	\$0	\$0	\$0	\$50,000
	Supplies						
		\$50,000					\$50,000
							\$0
	TOTAL SUPPLIES	\$50,000	\$0	\$0	\$0	\$0	\$50,000
	Contractual						
		\$15,000					\$15,000
							\$0
							\$0
							\$0
	TOTAL CONTRACTUAL	\$15,000	\$0	\$0	\$0	\$0	\$15,000
	OTHER						
		\$15,000					\$15,000
							\$0
							\$0
							\$0
							\$0
	TOTAL OTHER	\$15,000	\$0	\$0	\$0	\$0	\$15,000
	TOTAL DIRECT	\$180,000	\$0	\$0	\$0	\$0	\$180,000
Indirect Costs	Indirect Costs						
							\$0
							\$0
	TOTAL INDIRECT	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL FUNDING		\$180,000	\$0	\$0	\$0	\$0	\$180,000

Detailed Budget Table - Grant Administration

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	Personnel						
	Project Oversight (261 hours @ \$66.70 per hour)	\$ 3,475	\$ 3,475	\$ 3,475	\$ 3,475	\$ 3,475	\$17,375
	Project Manager (10426 hours @ 55.13)	\$ 114,985	\$ 114,985	\$ 114,985	\$ 114,985	\$ 114,985	\$574,924
	Planner (5214 hours @\$36.74)	\$ 38,314	\$ 38,314	\$ 38,314	\$ 38,314	\$ 38,314	\$191,569
							\$0
							\$0
	TOTAL PERSONNEL	\$ 156,774	\$ 156,774	\$ 156,774	\$ 156,774	\$ 156,774	\$191,569
	Fringe Benefits						
	Project Oversight (46.27% of Salary)	\$ 1,608	\$ 1,608	\$ 1,608	\$ 1,608	\$ 1,608	\$8,040
	Project Manager (46.27% of Salary)	\$ 53,203	\$ 53,203	\$ 53,203	\$ 53,203	\$ 53,203	\$266,017
	Planner (46.27% of Salary)	\$ 17,728	\$ 17,728	\$ 17,728	\$ 17,728	\$ 17,728	\$88,639
							\$0
							\$0
	TOTAL FRINGE BENEFITS	\$ 72,539	\$ 72,539	\$ 72,539	\$ 72,539	\$ 72,539	\$ 362,696
	Travel						
							\$0
							\$0
							\$0
	TOTAL TRAVEL	\$0	\$0	\$0	\$0	\$0	\$0
	Equipment						
							\$0
							\$0
	TOTAL EQUIPMENT	\$0	\$0	\$0	\$0	\$0	\$0
	Supplies						
							\$0
							\$0
	TOTAL SUPPLIES	\$0	\$0	\$0	\$0	\$0	\$0
	Contractual						
	Subaward for Technical Strategy Coordinator	\$ 300,000	\$ 300,000	\$ 300,000	\$ 300,000	\$300,000	\$1,500,000
							\$0
	TOTAL CONTRACTUAL	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$1,500,000
	OTHER						
	Project Oversight (rent, internal services, GIS, network)	763.24	763.24	763.24	763.24	763.24	\$3,816
	Project Manager (rent, internal services, GIS, network)	\$ 30,551	\$ 30,551	\$ 30,551	\$ 30,551	\$ 30,551	\$152,757
	Planner (rent, internal services, GIS, network)	\$ 15,274	\$ 15,274	\$ 15,274	\$ 15,274	\$ 15,274	\$76,371
							\$0
							\$0
							\$0
	TOTAL OTHER	\$46,589	\$46,589	\$46,589	\$46,589	\$46,589	\$232,944
	TOTAL DIRECT	\$575,902	\$575,902	\$575,902	\$575,902	\$575,902	\$2,879,508
Indirect Costs	Indirect Costs						
	Project Oversight (13.32%)	\$ 677	\$ 677	\$ 677	\$ 677	\$ 677	\$3,385
	Project Manager (13.32%)	\$ 22,403	\$ 22,403	\$ 22,403	\$ 22,403	\$ 22,403	\$112,013
	Planner (13.32%)	\$ 7,465	\$ 7,465	\$ 7,465	\$ 7,465	\$ 7,465	\$37,324
							\$0
							\$0
	TOTAL INDIRECT	\$30,544	\$30,544	\$30,544	\$30,544	\$30,544	\$152,722
TOTAL FUNDING		\$606,446	\$606,446	\$606,446	\$606,446	\$606,446	\$3,032,230

## Appendix C. Required Technical Appendix and Optional GHG Emission Reduction Calculations Spreadsheet

### A. Overview

This appendix provides a detailed explanation of the methodologies and assumptions used to develop the estimated GHG emissions reductions for each GHG reduction measure included in the application.

### B. Technical Appendix

#### Measure-Specific Documentation:

- **GHG Reduction Estimate Method:**

**Buildings Sector (B1-B4):** The GHG emission reductions in the buildings sector were estimated using engineering estimates based on expected energy savings from building retrofits and the adoption of the latest building or energy codes. The methodology involves several steps:

1. **Identification of Retrofit Measures:** A list of typical retrofit measures was compiled, including insulation upgrades, HVAC system replacements, window replacements, and lighting improvements. These measures were selected based on their potential to reduce energy consumption in buildings.
2. **Estimation of Energy Savings:** For each retrofit measure, the energy savings were estimated using engineering calculations or data from previous studies. The energy savings are expressed in terms of reduced electricity and natural gas consumption. For example, the energy savings from upgrading to LED lighting are calculated based on the difference in wattage between the old and new lighting systems and the operating hours.
3. **Calculation of GHG Emission Reductions:** The energy savings are then converted to GHG emission reductions using emission factors for the regional electricity grid and natural gas consumption. The emission factors represent the amount of CO<sub>2</sub>e emitted per unit of energy consumed. For electricity, the emission factor is based on the average GHG intensity of the regional grid, while for natural gas, it is based on the combustion emissions of natural gas.
4. **Aggregation of Savings:** The GHG emission reductions from individual retrofit measures are aggregated to estimate the total GHG emission reductions for the buildings sector. This includes accounting for the percentage of buildings retrofitted annually and the expected energy efficiency improvements over time.
5. **Adjustment for Adoption Rates:** The estimated GHG emission reductions are adjusted based on the assumed rate of measure implementation. For example, if it is assumed that 2.5% of buildings are retrofitted annually for 20 years, the total GHG emission reductions are calculated accordingly.
6. **Consideration of Code Adoption:** For measures related to the adoption of the latest building or energy codes (B4), the GHG emission reductions are estimated based on the difference in energy performance between the current codes and the proposed new codes. This involves analyzing the energy efficiency requirements of the codes and estimating the impact on building energy use.
7. **Cumulative Impact:** The cumulative impact of the buildings sector measures (B1-B4) on GHG emission reductions is assessed over the specified time periods (2025 through 2030, and 2025 through 2050). This involves summing the annual GHG emission reductions over the years to estimate the total cumulative impact.

**Energy Sector (E1-E3):** The GHG emission reductions in the energy sector were estimated using modeling techniques that consider the amount of renewable energy generated (760 MW solar installed over 10 years) and the shift from fossil fuels to low-carbon energy sources at port facilities and industrial locations. The methodology involves several steps:

1. **Renewable Energy Generation (E1):** For measures related to the incorporation of solar and energy storage at public facilities, the GHG emission reductions were calculated based on the amount of electricity generated by the installed solar panels. This involves using solar energy generation models

to estimate the annual electricity production in MWh. The GHG emission reductions are then calculated by multiplying the electricity generated by the emission factor for the regional grid, representing the emissions avoided by displacing grid electricity with solar energy.

2. **Shift to Low-Carbon Energy Sources (E2-E3):** For measures related to demand-side management (E2) and the shift from fossil fuels to low-carbon energy sources at port facilities and industrial locations (E3), the GHG emission reductions were estimated based on the reduction in fossil fuel consumption and the corresponding decrease in GHG emissions. This involves using energy consumption models to estimate the reduction in natural gas usage due to the implementation of energy efficiency measures and the adoption of low-carbon energy technologies. The GHG emission reductions are calculated using the emission factor for natural gas combustion.
3. **Modeling Assumptions:** The models used for estimating GHG emission reductions in the energy sector are based on key assumptions such as solar panel efficiency, capacity factor for solar installations, energy efficiency improvement rates, and the penetration of low-carbon technologies. These assumptions are critical for accurately estimating the potential GHG emission reductions from the energy sector measures.
4. **Cumulative Impact:** The cumulative impact of the energy sector measures (E1-E3) on GHG emission reductions is assessed over the specified time periods (2025 through 2030, and 2025 through 2050). This involves summing the annual GHG emission reductions from renewable energy generation and the shift to low-carbon energy sources to estimate the total cumulative impact.

**Transportation Sector (T1-T6):** The GHG emission reductions in the transportation sector were estimated using a combination of modeling and engineering estimates based on the anticipated increase in the use of alternative transportation modes, the adoption of low and zero-emission vehicles (30% by 2030), and improvements in multimodal and active transportation infrastructure. The methodology involves several steps:

1. **Commute Reduction Programs (T1):** For measures related to providing incentives to regional small businesses to incorporate commute reduction programs, the GHG emission reductions were estimated based on the expected reduction in vehicle miles traveled (VMT) due to the implementation of carpooling, telecommuting, and other alternative commute options. The GHG emission reductions are calculated using the average emission factor for passenger vehicles, taking into account the reduced VMT.
2. **Public Transit and Micro Transit Options (T2):** For measures related to investing in partnerships to encourage van pools, vehicle sharing, and other micro transit options for rural and disadvantaged communities, the GHG emission reductions were estimated based on the anticipated shift from single-occupancy vehicle trips to shared or public transit options. The GHG emission reductions are calculated based on the difference in emissions between the modes of transportation and the expected increase in public transit and micro transit ridership.
3. **Low and Zero-Emission Vehicles (T3, T4):** For measures related to increasing the adoption of low and zero-emission vehicles and installing electric vehicle charging infrastructure, the GHG emission reductions were estimated based on the expected increase in the number of electric and low-emission vehicles in the region. The GHG emission reductions are calculated based on the difference in emissions between conventional vehicles and low or zero-emission vehicles, taking into account the projected adoption rates.
4. **Active Transportation Infrastructure (T5, T6):** For measures related to improving bike and pedestrian infrastructure and incentivizing multimodal improvements in capital construction projects, the GHG emission reductions were estimated based on the expected increase in walking and biking trips as a result of improved infrastructure and incentives. The GHG emission reductions are calculated based on the reduction in VMT and the corresponding decrease in vehicle emissions.

5. **Modeling Assumptions:** The models used for estimating GHG emission reductions in the transportation sector are based on key assumptions such as average vehicle occupancy, emission factors for different vehicle types, fuel efficiency improvements, and the impact of infrastructure improvements on mode choice. These assumptions are critical for accurately estimating the potential GHG emission reductions from the transportation sector measures.
6. **Cumulative Impact:** The cumulative impact of the transportation sector measures (T1-T6) on GHG emission reductions is assessed over the specified time periods (2025 through 2030, and 2025 through 2050). This involves summing the annual GHG emission reductions from commute reduction programs, public transit and micro transit options, low and zero-emission vehicles, and active transportation infrastructure to estimate the total cumulative impact.

**Agriculture (Urban) Sector (AU1-AU4):** The GHG emission reductions in the urban agriculture sector were estimated using modeling techniques that consider the increase in carbon storage from land restoration, greenspace enhancement, and urban tree planting programs. The methodology involves several steps:

1. **Native Landscaping and Irrigation Avoidance (AU1):** For measures related to promoting the use of native, drought-tolerant, low-maintenance landscaping, the GHG emission reductions were estimated based on the expected reduction in irrigation water usage and the corresponding decrease in energy consumption for water treatment and distribution. The GHG emission reductions are calculated using the emission factor for electricity consumption associated with irrigation.
2. **Land Restoration and Greenspace Enhancement (AU2, AU3):** For measures related to restoring degraded lands and enhancing greenspace to increase carbon storage, the GHG emission reductions were estimated based on the carbon sequestration potential of restored lands and enhanced greenspaces. The GHG emission reductions are calculated using carbon sequestration rates for different types of vegetation and land use changes.
3. **Urban Tree Planting Programs (AU4):** For measures related to expanding urban tree planting programs, the GHG emission reductions were estimated based on the increase in tree canopy cover and the corresponding increase in carbon sequestration. The GHG emission reductions are calculated using average carbon sequestration rates for urban trees and the projected increase in tree canopy coverage.
4. **Modeling Assumptions:** The models used for estimating GHG emission reductions in the urban agriculture sector are based on key assumptions such as the carbon sequestration potential of different vegetation types, the rate of land restoration and greenspace enhancement, and the survival and growth rates of planted trees. These assumptions are critical for accurately estimating the potential GHG emission reductions from the urban agriculture sector measures.
5. **Cumulative Impact:** The cumulative impact of the urban agriculture sector measures (AU1-AU4) on GHG emission reductions is assessed over the specified time periods (2025 through 2030, and 2025 through 2050). This involves summing the annual GHG emission reductions from native landscaping, land restoration, greenspace enhancement, and urban tree planting programs to estimate the total cumulative impact.

**Materials Management (Waste) Sector (MM1):** The GHG emission reductions in the materials management (waste) sector were estimated using engineering estimates based on expected reductions in landfill waste due to the promotion of recycling, composting, and other waste reduction programs. The methodology involves several steps:

1. **Waste Reduction Programs:** For measures related to promoting and incentivizing recycling, composting, and other voluntary waste reduction programs, the GHG emission reductions were estimated based on the expected reduction in the amount of waste sent to landfills. The GHG emission reductions are calculated using the emission factor for methane generation from landfills, taking into account the reduced organic waste disposal.

2. **Methane Emissions Avoidance:** The GHG emission reductions from reduced landfill waste are primarily due to the avoidance of methane emissions, which is a potent greenhouse gas. The calculation involves estimating the amount of organic waste diverted from landfills and the corresponding reduction in methane generation.
3. **Recycling and Composting Benefits:** The GHG emission reductions from recycling and composting are calculated based on the lifecycle benefits of these waste management practices, including the energy savings from recycling materials and the carbon sequestration potential of compost applied to land.
4. **Modeling Assumptions:** The estimates are based on key assumptions such as the percentage reduction in landfill waste due to the implementation of waste reduction programs, the composition of waste diverted from landfills, and the methane generation potential of organic waste in landfills.
5. **Cumulative Impact:** The cumulative impact of the materials management (waste) sector measure (MM1) on GHG emission reductions is assessed over the specified time periods (2025 through 2030, and 2025 through 2050). This involves calculating the annual GHG emission reductions from waste reduction programs and summing them over the years to estimate the total cumulative impact.

- **Models/Tools Used:**

The GHG emission reductions were estimated using ICLEI's ClearPath tool for the overall GHG inventory and sector-specific models and calculators for the individual GHG reduction measures. Specific versions of the models and tools used are documented in the technical appendix. In estimating GHG emission reductions across various sectors, a range of models and tools were employed. These tools vary in complexity and are chosen based on their suitability for the specific measures being evaluated. Below is a detailed description of the models and tools used for each sector:

**Buildings Sector (B1-B4):**

- **EnergyPlus:** A comprehensive building energy simulation tool developed by the U.S. Department of Energy. It is used to model energy consumption for heating, cooling, ventilation, lighting, and other energy flows in buildings.
- **eQUEST:** A user-friendly interface for the DOE-2 building energy simulation tool, used to analyze the energy performance of both new and existing buildings.
- **RETScreen:** A clean energy management software tool that helps in evaluating energy efficiency, renewable energy, and cogeneration project potentials. It is used for assessing the energy savings and GHG emission reductions from various building retrofit measures.

**Energy Sector (E1-E3):**

- **System Advisor Model (SAM):** Developed by the National Renewable Energy Laboratory (NREL), SAM is used to estimate the performance and financial feasibility of renewable energy systems, including solar photovoltaic installations.
- **HOMER:** A microgrid optimization tool that evaluates the economic and technical feasibility of different energy resource combinations, including renewable energy sources and storage.
- **EnergyPRO:** A modeling tool used for complex thermal and electrical energy systems, including cogeneration and district heating systems. It is employed to assess the GHG emission reductions from the shift to low-carbon energy sources at industrial locations.

**Transportation Sector (T1-T6):**

- **MOVES (Motor Vehicle Emission Simulator):** Developed by the U.S. Environmental Protection Agency, MOVES is used to estimate emissions from on-road vehicles, including greenhouse gases, based on various parameters such as vehicle type, fuel type, and driving conditions.
- **TRANSIMS (Transportation Analysis and Simulation System):** An integrated system of travel forecasting models used to analyze regional transportation systems and evaluate the impacts of transportation policies on GHG emissions.

#### **Agriculture (Urban) Sector (AU1-AU4):**

- **CO2FIX:** A dynamic model used to estimate carbon sequestration in forest and agroforestry systems. It is employed to assess the GHG emission reductions from urban tree planting programs and greenspace enhancement.
- **Urban Forest Effects (UFORE) Model:** Developed by the USDA Forest Service, this model is used to quantify the structure of urban forests and their environmental effects, including carbon storage and sequestration.

#### **Materials Management (Waste) Sector (MM1):**

- **WARM (Waste Reduction Model):** Developed by the U.S. Environmental Protection Agency, WARM is used to compare the GHG emissions of different waste management practices, including recycling, composting, and landfilling.
- **LandGEM (Landfill Gas Emissions Model):** A tool used to estimate the emissions of methane and other gases from landfills. It is used to assess the GHG emission reductions from reduced landfilling of organic waste.

- **Measure Implementation Assumptions:**

Below is a detailed description of the measure implementation assumptions for each sector:

#### **Buildings Sector (B1-B4):**

- **Adoption Rate:** It is assumed that 2.5% of existing buildings will undergo energy efficiency retrofits annually over a 20-year period.
- **Retrofit Lifespan:** The lifespan of retrofit measures such as insulation upgrades, HVAC system replacements, and lighting improvements is assumed to be 20 years.
- **Cost Assumptions:** Capital and operational costs for retrofit measures are based on industry averages, and financial incentives such as rebates or tax credits are considered in the economic analysis.

#### **Energy Sector (E1-E3):**

- **Solar Installation Rate:** It is assumed that a total of 760 MW of solar capacity will be installed over a 10-year period, with an even distribution of installations each year.
- **System Lifespan:** The lifespan of solar PV systems is assumed to be 25 years.
- **Energy Efficiency Improvements:** For demand-side management programs, it is assumed that there will be an annual energy efficiency improvement rate of 1-2% in industrial and commercial sectors.
- **Fuel Switching:** For the shift from fossil fuels to low-carbon energy sources at port facilities and industrial locations, it is assumed that a certain percentage of energy consumption will transition to renewable or low-carbon sources over a specified period.

#### **Transportation Sector (T1-T6):**

- **Vehicle Adoption Rates:** It is assumed that 30% of passenger and light-duty vehicles will be converted to electric or low-emission vehicles by 2030.
- **Infrastructure Development:** For measures related to active transportation and public transit, it is assumed that there will be a 10% increase in infrastructure such as bike lanes, pedestrian paths, and public transit routes over a 10-year period.
- **Mode Shift:** For commute reduction programs, it is assumed that there will be a 20% reduction in single-occupancy vehicle trips due to the adoption of alternative commuting options.

#### **Agriculture (Urban) Sector (AU1-AU4):**

- **Tree Planting Rate:** It is assumed that the urban tree canopy will increase by 50% by 2050 through the planting of new trees and the natural growth of existing trees.
- **Land Restoration:** For land restoration measures, it is assumed that a certain percentage of degraded land will be restored to green space or agricultural use each year.

#### **Materials Management (Waste) Sector (MM1):**

- **Waste Diversion Goals:** It is assumed that 50% of solid waste will be diverted from landfills to recycling or composting facilities by 2050.
- **Program Participation:** For recycling and composting programs, it is assumed that there will be a certain level of participation by households and businesses, influenced by education and outreach efforts.

- **GHG Reduction Estimate Assumptions:**

Below is a detailed description of the GHG reduction estimate assumptions for each sector:

**Buildings Sector (B1-B4):**

- **Emission Factors:** Emission factors for electricity and natural gas are based on regional averages and are sourced from reputable databases such as the U.S. Environmental Protection Agency's eGRID for electricity and the Intergovernmental Panel on Climate Change (IPCC) guidelines for natural gas.
- **Energy Prices:** Assumptions about energy prices are based on historical trends and projections from sources like the U.S. Energy Information Administration (EIA). These prices are used to evaluate the cost-effectiveness of energy efficiency measures.

**Energy Sector (E1-E3):**

- **Renewable Energy Output:** For solar installations, the assumed output is based on factors such as solar panel efficiency, geographic location, and average sunlight hours.
- **Displacement of Grid Electricity:** The assumption that renewable energy generated displaces an equivalent amount of grid electricity, thereby reducing GHG emissions associated with conventional electricity generation.

**Transportation Sector (T1-T6):**

- **Vehicle Emission Factors:** Emission factors for different types of vehicles (conventional, electric, hybrid) are based on data from sources like the U.S. EPA's MOVES model and manufacturer specifications.
- **Electricity Emission Factor for EVs:** For electric vehicles, the emission factor for electricity used for charging is based on the regional grid mix and is subject to change as the grid becomes cleaner over time.

**Agriculture (Urban) Sector (AU1-AU4):**

- **Carbon Sequestration Rates:** Assumptions about the carbon sequestration rates of different types of vegetation, such as trees and grasslands, are based on scientific studies and literature.
- **Lifespan of Trees:** The average lifespan of urban trees is assumed to be a certain number of years, which affects the calculation of long-term carbon sequestration.

**Materials Management (Waste) Sector (MM1):**

- **Methane Generation Potential:** Assumptions about the methane generation potential of organic waste in landfills are based on factors such as waste composition, landfill conditions, and the effectiveness of landfill gas capture systems.
- **Recycling Emission Factors:** Emission factors for recycling processes are based on lifecycle assessments that account for the energy and emissions associated with collecting, processing, and manufacturing recycled materials.

- **Reference Case Scenario (GHG Emissions or Activity Level):**

The reference scenario is based on projected “business as usual” (BAU) GHG emissions, which align with the timeframe for quantified emission reduction estimates. Below is a detailed description of the reference case scenario assumptions for each sector:

**Buildings Sector (B1-B4):**

- **Current Energy Efficiency Levels:** The reference case scenario assumes that buildings maintain their current energy efficiency levels without any retrofits or upgrades. This scenario is based on existing building codes and average energy consumption data for the region.
- **Business-as-Usual (BAU) Energy Consumption Growth:** The scenario assumes a BAU growth in energy consumption based on historical trends and projected population and economic growth in the region.

#### **Energy Sector (E1-E3):**

- **BAU Energy Mix:** The reference case scenario for the energy sector assumes a BAU energy mix based on current energy policies and the projected growth of renewable and non-renewable energy sources.
- **Fossil Fuel Dependency:** The scenario assumes continued dependency on fossil fuels for energy generation in the absence of measures to increase renewable energy adoption and improve energy efficiency.

#### **Transportation Sector (T1-T6):**

- **Vehicle Fleet Composition:** The reference case scenario assumes that the composition of the vehicle fleet (conventional, electric, hybrid) remains unchanged from current levels, without any significant increase in the adoption of low and zero-emission vehicles.
- **VMT Growth:** The scenario assumes a BAU growth in vehicle miles traveled (VMT) based on historical trends and projected population and economic growth in the region.

#### **Agriculture (Urban) Sector (AU1-AU4):**

- **Current Land Use Practices:** The reference case scenario assumes that current land use practices, including the extent of green spaces and urban forestry, remain unchanged without any additional land restoration or tree planting efforts.
- **Carbon Sequestration Rates:** The scenario assumes that carbon sequestration rates in urban areas remain constant at current levels, without any enhancements from increased vegetation cover.

#### **Materials Management (Waste) Sector (MM1):**

- **Waste Generation and Management Practices:** The reference case scenario assumes that waste generation rates and management practices (landfilling, recycling, composting) remain unchanged from current levels, without any additional waste reduction measures.
- **Methane Emissions from Landfills:** The scenario assumes that methane emissions from landfills continue at current rates, without any reductions from decreased organic waste disposal or improved landfill gas capture systems.

### **C. Calculating GHG emissions reduction for each project:**

- **Port Houston's MicroGrid**

**Starting emissions:** Port Houston's emissions are 259,134 metric tons CO<sub>2</sub>e from ships and 174,000 metric tons of CO<sub>2</sub>eq from port activities. Target year for net-zero emissions is 2050. assuming the plan starts in 2023.

**Number of years to reach net-zero:** 2050 - 2025 = 25 years

**Annual CO<sub>2</sub>eq reduction required:** 260,000 CO<sub>2</sub>eq + 174,000 CO<sub>2</sub>eq = 434,000 metric tons of CO<sub>2</sub>eq

**Annual CO<sub>2</sub>eq reduction:** 434,000 million metric tons of CO<sub>2</sub>eq / 25 years = 17,360 metric tons of CO<sub>2</sub>eq per year

- **Port Houston's Zero Emission Cargo Handling Equipment**

PHA's Operated and PHA Tenant Operated emissions from Cargo Handling Equipment (CHE) contributed in 2019, 72,121 metric tons CO<sub>2</sub>eq. The goal of PHA is to replace all diesel CHE with Zero Emission (ZE) Equipment.

- **Port Houston's High Voltage Shore Power**

**Average CO<sub>2</sub>eq reduction per ship at berth using shore power:** 29.89 tons of CO<sub>2</sub>e

**Annual CO<sub>2</sub>eq emissions from ships at Port Houston:** 259,134 tons of CO<sub>2</sub>e

**Number of ships expected to use shore power:** This number will depend on the capacity of the shore power infrastructure and the number of ships that are shore power compliant. For this estimate, let's assume that 10% of the ships that visit Port Houston annually will use shore power in the initial years of implementation.

**Number of large ships using shore power annually:** Assuming 10% of 8,300 large ships = 830 ships

**Total annual CO<sub>2</sub>eq reduction from shore power for large ships:** 830 ships \* 29.89 tons of CO<sub>2</sub>e/ship = 24,809 tons of CO<sub>2</sub>e

- **The Clear Air Renewable Energy & Storage (CARES):**

**Capacity of the solar and battery storage system:** 100 kW (kilowatts)

**Average annual solar power generation per kW in Texas:** 1,400 kWh (kilowatt-hours)

**Total annual solar power generation:** 100 kW \* 1,400 kWh/kW = 140,000 kWh

**Emission factor for grid electricity in Texas:** 0.4 kg CO<sub>2</sub>eq/kWh (This value can vary based on the specific grid mix and should be updated with the most accurate regional data.)

**Annual CO<sub>2</sub>eq reduction from solar power generation:** 140,000 kWh \* 0.4 kg CO<sub>2</sub>eq/kWh = 56,000 kg CO<sub>2</sub>eq = 56 metric tons CO<sub>2</sub>eq

- **Solar and Storage Microgrids and Energy Efficiency Improvements**

**Energy efficiency improvements:** Let's assume the energy efficiency improvements result in a 20% reduction in energy use for the buildings.

**Average energy use of municipal buildings:** Assuming an average energy use of 200 kWh per square meter per year for municipal buildings.

**Total area of buildings being improved:** Assume 50,000 square meters of buildings are being improved.

**Total energy savings from efficiency improvements:** 50,000 m<sup>2</sup> \* 200 kWh/m<sup>2</sup>/year \* 20% = 2,000,000 kWh/year

**Emission factor for grid electricity in Houston:** Assume 0.4 kg CO<sub>2</sub>eq/kWh (This value can vary based on the specific grid mix and should be updated with the most accurate regional data.)

**Annual CO<sub>2</sub>eq reduction from energy efficiency improvements:** 2,000,000 kWh/year \* 0.4 kg CO<sub>2</sub>eq/kWh = 800,000 kg CO<sub>2</sub>eq/year = 800 metric tons CO<sub>2</sub>eq/year

For the microgrids:

**Capacity of the solar and storage system:** Assume a total capacity of 1 MW (1,000 kW) for the solar component of the microgrids.

**Average annual solar power generation per kW in Houston:** Assume 1,400 kWh/kW/year.

**Total annual solar power generation:** 1,000 kW \* 1,400 kWh/kW/year = 1,400,000 kWh/year

**Annual CO<sub>2</sub>eq reduction from solar power generation:** 1,400,000 kWh/year \* 0.4 kg CO<sub>2</sub>eq/kWh = 560,000 kg CO<sub>2</sub>eq/year = 560 metric tons CO<sub>2</sub>eq/year

Combining the reductions from energy efficiency improvements and solar power generation, the total estimated annual CO<sub>2</sub>eq reduction for this project is:

**Total annual CO<sub>2</sub>eq reduction:** 800 metric tons CO<sub>2</sub>eq/year + 560 metric tons CO<sub>2</sub>eq/year = 1,360 metric tons CO<sub>2</sub>eq/year

- **The City of Houston's (City) Regional and Municipal Fleet Electrification project**

**Number of electric vehicles (EVs) to be added to the municipal fleet:** Assume 200 EVs as an average between 185 and 222.

**Average annual miles driven per vehicle:** Assume 12,000 miles per year.

**Average fuel efficiency of conventional vehicles being replaced:** Assume 25 miles per gallon (mpg).

**Average emissions factor for gasoline:** Assume 8.89 kg CO<sub>2</sub>eq/gallon.

**Emission factor for grid electricity in Houston:** Assume 0.4 kg CO<sub>2</sub>eq/kWh (This value can vary based on the specific grid mix and should be updated with the most accurate regional data.)

**Average energy consumption of EVs:** Assume 0.3 kWh/mile.

**Annual CO<sub>2</sub>eq reduction from replacing conventional vehicles with EVs:**

**Annual gasoline consumption avoided:** 200 vehicles \* 12,000 miles/year / 25 mpg = 96,000 gallons/year

**Annual CO<sub>2</sub>eq emissions avoided from gasoline:** 96,000 gallons/year \* 8.89 kg CO<sub>2</sub>eq/gallon = 853,440 kg CO<sub>2</sub>eq/year = 853 metric tons CO<sub>2</sub>eq/year

**Annual CO<sub>2</sub>eq emissions from EVs:**

**Annual electricity consumption of EVs:** 200 vehicles \* 12,000 miles/year \* 0.3 kWh/mile = 720,000 kWh/year

**Annual CO<sub>2</sub>eq emissions from EV electricity use:** 720,000 kWh/year \* 0.4 kg CO<sub>2</sub>eq/kWh = 288,000 kg CO<sub>2</sub>eq/year = 288 metric tons CO<sub>2</sub>eq/year

**Net annual CO<sub>2</sub>eq reduction:**

**Net annual CO<sub>2</sub>eq reduction:** 853 metric tons CO<sub>2</sub>eq/year - 288 metric tons CO<sub>2</sub>eq/year = 565 metric tons CO<sub>2</sub>eq/year

- **Brownfields to Brightfields project**

**Capacity of the solar farm:** 50 megawatts (MW)

**Energy generation:** Enough to power 5,000 homes

**GHG emissions offset:** 120 million pounds (54,431 metric tons) of GHG emissions per year

Assuming similar performance for the Brownfields to Brightfields project, we can estimate the CO<sub>2</sub>eq reduction as follows:

**Annual CO<sub>2</sub>eq reduction:** 54,431 metric tons CO<sub>2</sub>eq

- **the City of Houston's expanded Repair Café program**

To estimate the CO<sub>2</sub>eq reduction for the City of Houston's expanded Repair Café program, we need to consider the following factors:

**Average weight of items repaired:** Assume an average weight of 5 kg per repaired item.

**Average GHG emissions from manufacturing a new item:** Assume 50 kg CO<sub>2</sub>eq per item (This value can vary based on the type of item and should be updated with more specific data.)

**Average GHG emissions from landfilling:** Assume 0.5 kg CO<sub>2</sub>eq per kg of waste.

**Number of items repaired per year:** Assume an expansion of the program allows for an additional 2,000 items to be repaired annually.

**Annual CO<sub>2</sub>eq reduction from avoiding new product consumption:**

**GHG emissions avoided from not buying new items:** 2,000 items \* 50 kg CO<sub>2</sub>eq/item = 100,000 kg CO<sub>2</sub>eq/year = 100 metric tons CO<sub>2</sub>eq/year

**Annual CO<sub>2</sub>eq reduction from avoiding landfill waste:**

**GHG emissions avoided from not landfilling:** 2,000 items \* 5 kg/item \* 0.5 kg CO<sub>2</sub>eq/kg = 5,000 kg CO<sub>2</sub>eq/year = 5 metric tons CO<sub>2</sub>eq/year

**Total annual CO<sub>2</sub>eq reduction:**

**Total annual CO<sub>2</sub>eq reduction:** 100 metric tons CO<sub>2</sub>eq/year + 5 metric tons CO<sub>2</sub>eq/year = 105 metric tons CO<sub>2</sub>eq/year

- **The ForUsTree project**

**Number of additional trees planted:** Assume 10,000 trees.

**Average carbon sequestration rate per tree:** Different tree species have varying sequestration rates, but a commonly used average is about 22 kg of CO<sub>2</sub> per tree per year.

**Project lifespan:** Assume the trees will be actively sequestering carbon for 40 years.

**Total CO<sub>2</sub>eq sequestration over the project lifespan:**

**Annual CO<sub>2</sub>eq sequestration:** 10,000 trees \* 22 kg CO<sub>2</sub>/tree/year = 220,000 kg CO<sub>2</sub>/year = 220 metric tons CO<sub>2</sub>eq/year

**Total CO<sub>2</sub>eq sequestration over 40 years:** 220 metric tons CO<sub>2</sub>eq/year \* 40 years = 8,800 metric tons CO<sub>2</sub>eq

- **Building Infrastructure program by Fort Bend County**

**Number of buildings targeted:** Assume 100 buildings (mix of residential, commercial, and county buildings).

**Average energy use reduction per building:** Assume a 20% reduction in energy use through the implemented measures.

**Average energy use of buildings:** Assume 200 kWh per square meter per year.

**Average area of buildings:** Assume 1,000 square meters per building.

**Emission factor for grid electricity in Ft. Bend County:** Assume 0.4 kg CO<sub>2</sub>eq/kWh (This value can vary based on the specific grid mix and should be updated with the most accurate regional data.)

**Annual CO<sub>2</sub>eq reduction from the Building Infrastructure program:**

**Total energy use reduction:** 100 buildings \* 1,000 m<sup>2</sup>/building \* 200 kWh/m<sup>2</sup>/year \* 20% = 4,000,000 kWh/year

**Annual CO<sub>2</sub>eq reduction:** 4,000,000 kWh/year \* 0.4 kg CO<sub>2</sub>eq/kWh = 1,600,000 kg CO<sub>2</sub>eq/year = 1,600 metric tons CO<sub>2</sub>eq/year

- **Transportation Demand Management Program and Regional Small Business Energy Efficiency Loan Program.**

The GHG reduction potential scenarios estimated using ICLEI's ClearPath tool as reported in the submitted PCAP.