

City of Waco Texas

Landfill Gas Emissions Destruction, Beneficial Use and Solar Utility

EV Refuse Trucks & Charging System and Recycling Center

Community Center Backup Power Generation facilities

Greenhouse Gas Reduction Measures and Facilities

Project Locations

1624 Hannah Hill Rd, Woodway, TX 76712 (LFG Facilities)

Recycle Center & EV Charging

Waco Community Centers and Animal Shelter

**Submitted per FY 2023 Climate Pollution Reduction Grants Program:
Implementation Grants General Competition**

CFDA 66.046 CPRG

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Appendices

<u>Description</u>	<u>File Extension</u>
Project Narrative	CityofWaco_Workplan
Budget Narrative	Budget_CityofWaco.pdf
	GHG Emission Calcs CityofWaco_landgem-v3.1beta_dec-2023.xls
	Techapps_CityofWaco.pdf
Other Attachments	texas-cprg-workplan.pdf
	Dallas-Fort Worth AQIP_PCAP-March_1_2024
	Areas_CityofWaco.xls
	CRPG_PETILLO_resume_CityofWaco
	CRPG_resume_Charles_Dowdell_CityofWaco
	24.03.01 -- Letter of Support Waco EPA Climate Pollution Reduction_240301_162007
	CityofWaco_Resolution_RES-2024-152_Adopted_03-19-2024

1. Introduction

a. Why Select Waco Projects

1. Commitment to Resilient and Sustainable Projects and Policies.
2. Use of 100% Renewable Energy.
3. Dedicated to diversion and recycling through city managed anchor facilities.
4. Innovative technological solutions to combat climate change.
5. Embraces equity and inclusion through policies and organizational values.
6. Multi sector approach to climate pollution reduction.



The **Waco** people (also spelled *Huaco*) are a branch of the Wichita Tribe of Native Americans who originally settled the Waco Texas area in the 1700s. Their society was agrarian, farming such crops such as melons, pumpkins, lima beans and corn. During the late fall and winter, Waco men would leave their villages for extended buffalo hunts. During the 1700s, they also had a lucrative trading partnership with the French. The existing Native American population in Waco is approximately 0.3%, according to the United States Census Bureau with a Black or African American population of 20.4% and a Hispanic or Latino population of 30.4%.¹

¹ <https://www.census.gov/quickfacts/fact/table/wacocitytexas/PST045223>

Waco is a ethnically diverse community that from the City Government to its citizenry support sustainable and resilient programs, infrastructure, policies and methods. Waco has a long-established Sustainable Resource Practices Advisory Board, Waco Business Alliance, an active Sustainable Waco community involvement organization. Waco has the perfect alignment with the EPA Climate Pollution Reduction Grant goals and strategies as demonstrated further in this workplan document. Waco created and active **Diversity, Equity & Inclusion** programs and policies with the following goals:

- Institute organizational policies and processes to ensure equity and accountability.
- Cultivate a thriving workforce within the organization ensuring racial equity.
- Improve the quality-of-life outcomes through racial equity initiatives.

The greenhouse reduction facilities and measures detailed within demonstrate a significant shift and commitment to renewable energy through its electrical power contracts that employ 100% renewable energy, its expanding fleet of electric vehicles, technological advancements that have been award winning, beneficial uses of landfill gases to reduce methane and carbon dioxide emissions and embracing climate change as a planetary boundary.

Waco, a city to believe in:

<https://www.youtube.com/watch?v=WrdNGc6wulc>

b. Overview and Motivation for Projects

This is a funding request for implementation measures and infrastructure facilities that will deeply benefit the disadvantaged communities (21.5% of the population at or below the poverty line) in Waco and surrounding region by reducing greenhouse emissions through a novel combination of a landfill gas emissions destruction and beneficial use and Solar Utility plant; increased recycling and diversion through construction of new recycling center, reduce fossil fuel emissions from coal powered plants by the a combination of a Solar Utility and Landfill Gas Emissions Destruction Beneficial Use plant, replacement of diesel-powered refuse trucks with Electric Recycling Trucks, construction implementation of four natural gas-powered backup generators at community centers in disadvantaged areas of Waco (without funding these would diesel-powered), for renewable power generation through a solar utility plant at a closed landfill site, and high tech, high quality job training that will increase the economic output and empower citizens who could not afford such training in the disadvantaged communities. These measures combine to benefit multiple disadvantaged communities, add resiliency to the grid system, significantly reduce carbon and methane emissions, address climate adaptation and create venues for positive climate change.

While not included in this grant request for funding purposes, a landfill gas destruction beneficial use facility is being pursued under a separate public-private partnership that will greatly benefit surrounding industries and disadvantaged communities. The emissions from the 232-acre landfill would result in massive GHG emissions, however the landfill gas wellfield and the geomembrane technology that would overlie the landfill as a cap (underlies the Solar Utility array), is extremely important in capturing the GHG emissions and conveying them to the beneficial facility for ultimate destruction. The destroyed emissions are included in the calculations that support the grant activity, vital to the overall reduction of these gases. The electricity generated and the reduction in GHG will directly benefit the communities through lower utility rates due to the electric power generated by the proposed plants and surrounding industries that will either directly or indirectly benefit from power purchases, sale of excess treated landfill gas, or heat for industrial use.

Using newly developing emission technology associated with a Baylor University (In partnership with the City of Waco) National Science Foundation Award Grant of \$1M, this Landfill Gas Emissions Destruction Beneficial Use plant will comprise a micro-grid system wherein emissions will be greatly reduced, and the air quality environment significantly enhanced. The ultimate goal of the technology developed under a collaborative effort of the City of Waco and Baylor University is to combust landfill gases with 1) near-zero emissions, 2) maximum energy capture, and 3) ability to burn a wide variety of gasses and oils from various waste sources that current systems can't effectively handle. Increased combustion efficiency would result in more effective destruction of methane, carbon dioxide and Non-Methane Volatile Organic Compounds (NMOC's) that biogenically form from waste decomposition.

Further, this request will expand recycling and diversion operations through construction of a new recycling facility, offering users expanded multiple options for diversion and waste reduction through recycling.

Current routes that use diesel powered refuse trucks are proposed to be replaced with all electric refuse trucks for recycling operations in the expanding downtown community of Waco, Texas. The trucks will be charged by an included DC charging station that will be powered by the City of Waco 100% renewable electric provider network.

As a part of this funding request, \$1,000,030 has been allocated to provide high-quality jobs and training opportunities, to be used for high-quality workforce development activities tied to the Solar Utility, expanded landfill gas wellfield, maintenance and service technicians for the EV Recycling Trucks. This training will be a part of the staffing and hiring of individuals to accomplish this metric. The proposed measure will benefit individuals in low-income and disadvantaged communities, as they will be targeted during workforce outreach and hiring events. Workforce development is community benefit through its creation of equitable career pathways and training opportunities. Specifically, this includes preparing individuals for high-quality, middle-skill career pathways that enable economic mobility and family stability.

The resiliency and financial viability of the landfill gas destruction beneficial use facility has been documented through a prior Feasibility Studies (SCS Engineers²). This study evaluated both the technical and financial potential for beneficial use and GHG destruction. The Feasibility Study reported: *“The projected quantity of LFG available in 2025, if the LFG collection system is fully built-out and upgraded, would support a little less than three Caterpillar 3520 1.6 MW engines.”*³

In summary, this grant application seeks funding for projects and measures as follows:

- A new, stand-alone GHG reduction measure that will be implemented solely through CPRG funding Both the Beneficial Use (Waste-to-Renewable Energy, and Solar Utility Plants), and EV Recycling Trucks with Charging Infrastructure;

Project (Not Requested for Funding): Beneficial Use of Landfill Gas Facility

This project is not included in the request for funding under the CPRG, but the supporting greenhouse reduction destruction values are included as this plant will be the end facility for this purpose.

Estimated Annual Greenhouse Gas Benefits:

31,250 metric tons of CO₂e from 2030 through 2050

Expected Community Benefits:

Improved Health and Well-Being; Improved public health resulting from reductions in co-pollutants (e.g., CAPs, such as NO_x, ozone, PM_{2.5}, and HAPs), such as reductions in new asthma cases and reductions in hospital admissions and emergency department visits, Increased Resiliency and Adaptability; Job Creation and Economic Development; and Increased Awareness and Understanding.

Project/Measure: Solar Utility Plant: \$24,945,760 (First Year Training and Operating Costs: \$1,240,470)

Estimated Annual Greenhouse Gas Benefits:

31,250 metric tons metric tons of CO₂e from 2030 through 2050

Expected Community Benefits:

Improved Health and Well-Being; Improved public health resulting from reductions in co-pollutants (e.g., CAPs, such as NO_x, ozone, PM_{2.5}, and HAPs), such as reductions in new asthma cases and reductions in hospital admissions and emergency department visits. Increased Resiliency and Adaptability; Mitigation of high utility bills for disadvantaged communities, reduction of landfill gas emissions from under liner below solar panels deployed Job Creation and Economic Development and Increased Awareness and Understanding.

Landfill cap covers are one of the key components of modern landfills as they prevent uncontrolled water infiltration and convey GHG emissions for destruction. The role of the landfill cover in mitigating greenhouse gas (GHG) emissions from landfills is essential. There fore the landfill gas

² City of Waco Landfill, TCEQ Permit No. MSW-948A, Phase 1 Landfill Gas (LFG) Feasibility Study; SCS Engineers dated September 2023

³ Transmittal of City of Waco Landfill Gas-to-Energy Feasibility Study; SCS Engineers, dated May 16, 2016

wellfield, Landfill Gas Emissions Destruction Beneficial Use plant and Solar Utility plant act with singular synergy to dramatically reduce GHG emissions⁴.

Project/Measure: EV Recycling Trucks and Battery Storage: \$3,014,000

Estimated Annual Greenhouse Gas Benefits:

4,750 metric tons metric tons of CO₂e from 2025 through 2030

19,000 metric tons of CO₂e from 2030 through 2050

Expected Community Benefits:

Improved Health and Well-Being; Increased Resiliency and Adaptability; Job

Creation and Economic Development; decreased reliance on fossil fuels and Increased Awareness and Understanding; and Reduced noise pollution

- An expansion of a GHG reduction measure that is already being implemented, where the expansion of the measure will be funded through CPRG funding (Recycling and Waste Diversion Center).

Project/Measure: Recycling Center with Waste Diversion: \$5,573,600

Estimated Annual Greenhouse Gas Benefits:

34,239 from 2025 to 2030, and 171,197 from 2030 to 2050 metric tons metric tons of CO₂e

Expected Community Benefits:

Improved Health and Well-Being; Increased Resiliency and Adaptability; Job

Creation and Economic Development; increased recycling and waste diversion, decreased recyclable waste going to landfill, and Increased Awareness and Understanding.

Increased Access to Recycling Services and Diversion of Wastes

This measure will result in Increased Access to Recycling Center drop off of materials that would otherwise be disposed of in the landfill. This widens the service area and lessens the impact of additional recyclable waste transported by waste collection trucks (this lessens greenhouse gas emissions).

- Adding electric vehicle charging stations at multiple locations, especially at or near disadvantaged communities providing equity and availability of charge points;

Project/Measure: EV Charging Stations: \$6,855,587

Estimated Annual Greenhouse Gas Benefits:

104,650 metric tons of CO₂e from 2025 through 2050, depending on the level of EV charging usage.

Expected Community Benefits:

Improved Health and Well-Being; decreased use of fossil fuels for gasoline powered Vehicles, Increased Resiliency and Adaptability; Job Creation and Economic Development; and Increased Awareness and Understanding.

- A new GHG reduction measure for which the partial funding has been secured and needs additional funding from the CPRG program to secure the total funding needed to fully implement the measure (Well field expansion to full build-out and Community Center Generators city-wide).

Project/Measure: Expanded Landfill Gas Wellfield: \$4,303,500

Estimated Annual Greenhouse Gas Benefits:

252,918 metric tons CH₄ and 8,619,460 metric tons of CO₂e from 2025 through 2050

Expected Community Benefits:

Improved Health and Well-Being; Improved public health resulting from reductions in co-pollutants (e.g., CAPs, such as NO_x, ozone, PM_{2.5}, and HAPs), such as reductions in new asthma cases and reductions in hospital admissions and emergency department visits. Increased Resiliency and Adaptability; Job Creation and Economic Development; and Increased Awareness and Understanding. Decreased odors, Increased Resiliency and Adaptability.

⁴ https://www.researchgate.net/publication/329775464_Influence_of_landfill_cap_cover_characteristics_on_the_mitigation_of_GHG_emissions

Project/Measure: Clean Fuel Community Center Power Generators: \$3,763,200
Estimated Annual Greenhouse Gas Benefits:

17.4 metric tons of CO₂e from 2025 through 2050, depending on the level of usage.

Expected Community Benefits:

Improved Health and Well-Being; Increased Resiliency and Adaptability; Job Creation and Economic Development; resiliency and safety during extreme climatic events, and Increased Awareness and Understanding.

EPA NOFO states “...encourages eligible applicants to seek implementation funds for GHG reduction measures that will significantly reduce cumulative GHG emissions by 2030 and beyond, and that will accelerate decarbonization across one or more major sectors responsible for GHG emissions (i.e., industry, electric power, transportation, commercial and residential buildings, agriculture/natural and working lands, and waste and materials management)..... Applications may include one or more proposed GHG reduction measures.”

In alignment with Executive Order 14082: *Implementation of the Energy and Infrastructure Provisions of the Inflation Reduction Act of 2022*, the City of Waco is in support the creation of high-quality, family-sustaining jobs with the free and fair choice to join a union (such as the Pipefitters Union for the Landfill Gas Emissions Destruction Beneficial Use Plant). This includes an emphasis on the quality of jobs, not just the number of jobs created by these federal investments. Specific strategies to ensure CPRG implementation grant funds and the implementation of the GHG reduction measures generate high-quality jobs with a diverse, highly skilled workforce and support “high road” labor practices are: (1) Job Fairs that target high school and Technical Trade Schools, such as Texas State Technical College in Waco, Texas that offers programs in Electrical Lineworker and Management Technology; (2) Robotics; (3) Industrial Systems; (4) Instrumentation Technology; (5) Plumbing and Pipefitting Technology; (6) Electric Power Control and Electromechanical Technology; and many more that specifically include job training skills for the measures and infrastructure requested in this grant.

Project/Measure: Stakeholder Meetings and Support, High Quality Workforce Engagement and Training: \$1,000,030
Expected Community Benefits:

Improved Health and Well-Being; Increased Resiliency and Adaptability; Highly skilled job training and Creation and Economic Development;

These projects will create jobs within the local disadvantaged communities from skilled, semi-skilled to labor class, significantly reduce greenhouse gases, add resilience to the grid, defer use of fossil fuels to generate power, add renewable energy and improve the local air quality and climate.

This grant application requests funding for multiple projects in three Sectors. Section I.B. Electric Power and Waste, Water, and Sustainable Materials Management; Electric Power and Transportation Sectors.

The applicable greenhouse reduction measures included in the Transportation Sector with the proposed projects fall under:

1. Programs to increase the share of electric light-, medium-, and heavy-duty vehicles, and to expand electric vehicle charging infrastructure (EV Charging Stations at multiple locations throughout the city. Some of these locations offer a charging station within or near disadvantaged communities).

The applicable greenhouse reduction measures included in the Electric Power Sector with the proposed projects fall under:

1. GHG performance standards for electric generating units (Landfill Gas Emissions Destruction Beneficial Use Project and integrated landfill gas wellfield full buildout).
2. Installation of renewable energy and energy storage systems on municipal facilities (Landfill Gas Emissions Destruction Beneficial Use Project wellfield full buildout, and Solar Utility Project).
3. Development of distributed or community-scale renewable energy generation, microgrids, or vehicle-to-grid infrastructure in disadvantaged communities, including remote and rural regions (Landfill Gas

Emissions Destruction Beneficial Use Project and integrated landfill gas wellfield full buildout, Solar Utility Project and Community wide Generators using Natural Gas Fuel).

The applicable greenhouse reduction measures included in the Waste, Water, and Sustainable Materials Management Sector includes:

1. Standards and incentives to reduce methane emissions from landfills...including through collection for use (proposed Recycling Center facility and EV Recycling Trucks) or destruction (Landfill Gas Emissions Destruction Beneficial Use plant and integrated landfill gas wellfield full buildout).
2. Programs and incentives to reduce or divert waste (including food and/or yard waste) through improved production practices, improved collection services, and increased reuse or recycling rates (Recycling Center).
3. Programs and incentives to reduce GHG emissions associated with plastics production, use, and waste management (Recycling Center).
4. Policies and programs to reduce construction and demolition waste through building reuse, deconstruction, and material diversion and reuse (Recycling Center)

Although these represent different projects in different locations utilizing different technologies, they form a carbon-reduction synergistic bond to reduce GHG, serve city-wide disadvantaged communities, increasing recycling and waste diversion, improve the environment through more healthful air and provision of sustainable and resilient energy sources. Detailed discussions of these measures are included in the following sections.

Workplan Subsections

a. Description of GHG Reduction Measures

The following table summarizes the reduction in greenhouse gases by implementing the measures and infrastructure facilities requested by this grant ask.

Implementation Measure	MT CH₄	MT CO₂e
Landfill Gas Wellfield to Full Extent 2025 to 2030 Emissions Avoided	65,184	410,260
Landfill Gas Wellfield to Full Extent 2030 to 2050 Emissions Avoided	187,734	8,205,200
Landfill Gas Emissions Destruction Beneficial Use plant 2025 to 2030	0	0
Landfill Gas Emissions Destruction Beneficial Use plant 2030 to 2050**		31,250
C & D Diversion 2025 to 2030 ⁵		419
C & D Diversion 2030 to 2050		1,796
Recycling Diverted 2025 to 2030 ⁶		34,239
Recycling Diverted 2030 to 2050 ⁷		171,197
EV Recycling Trucks 2025 to 2030 ⁸		4,750
EV Recycling Trucks 2030 to 2050		19,000
Natural-gas Powered Backup Generators (Diesel generators emit 20.3 MT CO ₂ for 4 generators) ⁹ 25 Years		17.4
CO ₂ emissions diverted annually EV Charging Stations ¹⁰ 25 Years (26,180 2025 to 2030; (104,720 2030 TO 2050)		104,650
Solar Utility 2030 to 2050*	n/a	31,250
Total MT CH₄ Methane Reduction 2025 to 2030	65,184	
Total MT CH₄ Methane Reduction 2030 to 2050	187,734	
Total MT CO₂ Carbon Dioxide Reduction 2025 to 2030		470,598
Total MT CO₂ Carbon Dioxide Reduction 2030 to 2050		8,543,430

* The Solar Utility plant which is planned for 10-acre of the 237-acre closed landfill would produce 1 MW, in its' startup year of 2030 would result in resulting in 1,250 tons CO₂e.

⁵The total carbon-emission-saving potential can be increased from 0.31 million t CO₂-e (2022) to 0.35 million t CO₂-e (2031). Estimating the Carbon Emission of Construction Waste Recycling Using Grey Model and Life Cycle Assessment: A Case Study of Shanghai July 19, 2022; Huang, editor

⁶ Assessing the environmental impact of waste management: A comparative study of CO₂ emissions with a focus on recycling and incineration, Journal of Cleaner Production; August 2023

⁷ City_of_Waco_GHG Waste Reduction Calculator warm_v15_nov2020 Excel Model

⁸ Battery electric could be 63% of refuse truck sales come 2030: report; by Maria Rachal, published in WasteDive, January 31, 2023.

⁹ Diesel generators produce particulate matter (PM), volatile organic compounds (VOCs), nitrous oxide (NOx) among other harmful pollutants that create smog and exacerbate respiratory conditions. FEA "The Carbon Footprint of Diesel Generators" <https://www.feace.com/single-post/the-carbon-footprint-of-diesel-generators>

¹⁰ Reuters: "Lifetime Carbon Emissions of Electric Vehicles vs Gasoline Cars: July 7, 2021: <https://www.reuters.com/business/autos-transportation/lifetime-carbon-emissions-electric-vehicles-vs-gasoline-cars-2021-06-29/>

**Total avoided CO₂ emissions

These combined measures and projects have multiple positive benefits to low-income and disadvantaged communities as included in the census tracts under the Climate and Economic Justice Screening Tool¹¹. These benefits are further discussed in Section 4 of this Workplan. Outputs that will or already have occurred or will occur as a result of this funding request from the implementation of GHG reduction measures will include:

1. Number of Zero-Emission or Low Emission Vehicles;

The City of Waco is implementing a Fleet Electrification Plan. Currently the city has an EV strength of 17, and evaluates the fleet based upon need and operating metrics of the current asset. The city was awarded the Federal Transit Administration Section 5339 Bus and Bus Facility Grant which will provide Waco Transit System (WTS) with \$3,133,129 in capital grant funding to be used for the replacement of WTS fleet vehicles with low/no emission vehicles and charging.

This request proposes the addition of two all-electric-powered refuse trucks that will serve the Waco Downtown District with recycling services. This route is currently run to diesel-powered refuse trucks that run consistent routes. While these trucks maximize collection efficiency through route smartware, recycling materials are not consistently placed at each stop. Since they spend time collecting and loading recyclables, they increase the risk of global warming and reduce air quality. Electric refuse trucks can eliminate these concerns. All electric trucks offer zero tailpipe emissions, so they don't contribute to greenhouse gases or create air pollution. In addition, the electric trucks will be charged from the City of Waco's 100% renewable energy contract providers.

Since the EV refuse trucks are much quieter than traditional diesel-powered trucks, they can move for collections during the early morning hours without disturbance to downtown neighborhoods, or anytime without causing noise pollution.

The addition of EV Charging stations at multiple locations encourages adoption of climate friendly options for citizens. EV chargers for historically disadvantaged communities that are important to communicate. People living in low-income communities are much more likely to experience larger environmental risks than those living in wealthier neighborhoods since low-income areas are more likely to experience air pollution. EV chargers can also benefit an area economically by creating more jobs, as local residents may be hired and trained as charger technicians.

2. Renewable Energy Installations and Smart Meters;

Waco has installed approximately 50,000 "smart water meters" water customers soon will be able to review their consumption by the hour, with potentially enough detail to find leaks, thereby conserving water resources.

3. Electrified Appliances (e.g., heat pumps) Installed; Buildings Retrofitted; Industrial Equipment Electrified; Biodigesters installed;

The city is implementing a wide variety of utility changes intended to reduce energy demand and create a more resilient infrastructure. A long-term energy guidance document was prepared in 2019 to recognize then current practices and initiatives, and to further guide the City of Waco on future energy purchases, opportunities for solar power, alternative fuel vehicles, building energy audits, facility construction and steps to assist the City of Waco in innovative energy procurement. The revised Energy Guidance Document, dated September 15, 2020, was subsequently prepared and provided to City of Waco Council in an Informal Report (IR-202-691 on October 6, 2020). The selection of an electrical energy provider provided **100% renewable energy**. In February 2020 the City of Waco selected MP2 Energy, Texas, LLC as the City's electricity provider. The contract term is for seven years beginning April 1, 2022, and ending in April 1, 2029. This is advantageous to the implementation of the proposed Facility, which if granted by EPA will come online in late 2028 and will then provide low electrical power rates to Waco, including its disadvantaged communities.

¹¹ <https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5>

MP2 Energy Texas, LLC currently sells the City of Waco 100% green, renewable energy from the following Texas wind and solar assets: Bruennings Breeze Wind, Chapman Wind, Stella Wind, Phoebe Energy Solar, and Prospero Solar. The price per KWh will be \$0.03226 which is 14.57% below the previous contractual rate of \$0.03776 per KWh.

By switching to a green energy contract, it is estimated that the City will save approximately 0.585 metric Tons Equivalent CO₂ per month, or 7.2 metric tons Equivalent CO₂ per year in carbon footprint reduction.

4. City Facility Utility Assessment Reports:

The City of Waco has completed two Utility Assessment Report (UAR) aimed at recommending equipment or technology installations at 60 City of Waco Facility. The first report was prepared by TEESI (Texas Energy Engineering Services Inc) and funded through the State Energy Conservation Office (SECO) program for Local Governments providing Preliminary Energy Assessments (PEAs). The second UAR was prepared by Centrica Business Solutions, Services, Inc. who completed a preliminary feasibility assessment for the City of Waco where they determined that there was significant potential energy and water savings (2022). The results of these studies have initiated a program to: (a) Replace lighting structures with LED lighting and control upgrades at 75% of the city buildings; (b) Install water conserving taps at 90% of the city buildings; (c) Seal building envelopes at 90% of the buildings; and, (d) Install programmable thermostats at 25% of the Facility.

5. Trees Planted:

In terms of natural resources, the area surrounding Waco can be described as rich urban forests with thousands of oaks, cottonwood and other species of trees, multiple streams and rivers and Lake Waco. Oak trees can store as high as 48 pounds of carbon dioxide every year, making them an excellent source for cleaning up environmental waste, and over their lifetime, and can individually store 14,400 pounds of CO₂. The proposed Solar Utility will offset the carbon emissions of 1,250 tons of CO₂. This is equivalent to planting from 38,750 to 57,500 trees per year of operation.

Waco has a 180-acre constructed wetlands at Lake Waco and is home to numerous plants, mammals, insects, amphibians and reptiles. These natural features act as carbon sinks and help to mitigate the climate. Wetlands sequester carbon from the atmosphere through plant photosynthesis and by acting as sediment traps for runoff.

Cameron Parks a 416-acre (168 ha) urban park featuring playgrounds, picnic areas, a cross-country running track, and a disc golf course. The park also contains Waco's 52-acre (21 ha) zoo. Waco Parks and Recreation planted 50 trees in and through the system of 29 parks, trails and recreational Facility.

Waco hosted an "Urban Forest" Conference¹² that is master planning more trees in parks, rights-of-ways, yards and floodplains in metropolitan areas. Waco's tree cover could double the size of the city's tree nursery near Waco Regional Airport, which has about 400 trees in various stages of growth. That would allow the city to plant about 100 trees a year in city parks and rights of way with many of the trees absorbing or sequestering carbon dioxide.

6. Staff hired to implement GHG reduction measures, associated low-income and disadvantaged community provisions, and associated training for workforce development:

Waco hired both a Sustainability Manager and a Chief Sustainability Officer that oversee GHG reduction measures, community involvement, planning and implementation of GHG reduction measures throughout the city and it's jurisdictional territories. One of its key performance metrics are policies that embrace Environmental Equity, Diversity and Inclusion. The purpose of this policy is to; (1) Create Medium to High Tech Jobs; (2) support renewable energy, reducing emissions, and accelerating the transition away from fossil fuels; (3) create local power projects that increase local and regional grid resiliency; (4) save money on energy bills; (4) ability to negotiate lower utility rates; (5) Target outreach and transparency to the community, especially disadvantaged communities; (6) facilitate

¹² "Tree Conference Brings "Urban Forest" Vision to Waco; Waco Tribune-Herald, October 1, 2021

accessible learning about the climate and ways to reduce GHG for all, especially disadvantaged communities; (7) enable education and skill-based knowledge; (8) Provide coordination and teamwork; and, (9) engage the community.

Through the program of Monthly Lunch and Learns, the Sustainability Division hosts monthly Lunch and Learns that offer a sociable, collaborative alternative to traditional "top-down" or classroom-based learning. This makes them a great way to foster a culture of learning and knowledge sharing. This encourages teamwork, community involvement, and helps to break down silos.

One of the Strategic Goals of the Sustainability Division is to strongly support Sustainability through which building a high performing City Government is achievable. Through this goal, staff (1) maintain Professional Licenses (Required Fees & Training); (2) education increases skills of staff; (3) keep current on trends and technology; and (4) credibility with community.

7. Number of high-quality jobs created throughout the applicant's jurisdiction and in low- income and disadvantaged communities.

In alignment with Executive Order 14082: *Implementation of the Energy and Infrastructure Provisions of the Inflation Reduction Act of 2022*, the City of Waco is in support the creation of high-quality, family-sustaining jobs with the free and fair choice to join a union (such as the Pipefitters Union for the Landfill Gas Emissions Destruction Beneficial Use Plant). This includes an emphasis on the quality of jobs, not just the number of jobs created by these federal investments. Specific strategies to ensure CPRG implementation grant funds and the implementation of the GHG reduction measures generate high-quality jobs with a diverse, highly skilled workforce and support "high road" labor practices are: (1) Job Fairs that target high school and Technical Trade Schools, such as Texas State Technical College in Waco, Texas that offers programs in Electrical Lineworker and Management Technology; (2) Robotics; (3) Industrial Systems; (4) Instrumentation Technology; (5) Plumbing and Pipefitting Technology; (6) Electric Power Control and Electromechanical Technology; and more that specifically include the measures and infrastructure requested in this grant. The Beneficial Use Landfill Gas to Energy Plant, Solar Utility, Recycling Center, EV Recycling Trucks and Community Center Propane Generators create multiple high tech, high paying jobs within the community from either the planning, design, construction, permitting and operation. Jobs will include engineering specialties for design, construction jobs, equipment manufacturing jobs, vendors, utility technicians, and increased employment for the end users of the products of this project.

The renewable energy plants will sustainably power many homes with clean, locally generated energy, and provide an estimated 25 direct new jobs and up to 150 jobs from construction to service maintenance indirectly to the area. The project will transform the closed landfill site MSW 948A into a multi-megawatt integrated renewable energy utility plant. The addition of multiple EV Charging Stations provides an opportunity for lower income residents to learn about the technology and be employed in the maintenance and care of the stations.

Other outcomes that have not been quantified, but are relevant include, but are not limited to: (1) lower energy demand and residential/commercial energy expenditures, spurring investment in the community; (2) reduced energy bills for residents in low-income and disadvantaged communities, throughout the City of Waco's jurisdiction; (3) reduced exposure to hazardous air pollution or unhealthy ambient air quality, increasing health benefits; (4) increased staff capacity to implement GHG reduction measures; and, (5) enhanced level of community engagement, as measured by an increased number of ongoing actions to engage with organizations and residents of disadvantaged communities, and other interested parties.

8. Increased resilience to climate change impacts. as measured by the number of buildings or Census tracts that meet certain resiliency standards.

Landfill gas to energy power systems are highly resilient to both cold and hot weather. The Anchorage Alaska Landfill Gas to Energy Project for example, where winter temperatures drop to minus 10 for periods which continue for weeks. Landfill gas to energy plants operating in Arizona face extreme operating temperatures above 110 degrees F without interruption.

Landfill gas is a highly reliable source of energy because it is generated 24 hours a day, 7 days a week. By using LFG to produce energy, landfills can significantly reduce their emissions of methane and avoid the need to generate energy from fossil fuels, thus reducing emissions of carbon dioxide, sulfur dioxide, nitrogen oxides, and other pollutants from fossil fuel combustion. When combined with solar power generation, the duo become effective plants for reduction of greenhouse gases.

Anthropogenic induced climate change has significant impacts to the resilience and delivery of electric power to the State's grid system in Texas. Extreme heat and cold affects the resilience of the grid and increases the potential for blackouts to occur. Specifically, the summer of 2023 was the hottest on record at Austin-Bergstrom International Airport, and the second-hottest ever observed at Camp Mabry. An extraordinary heatwave led to an all-time heat index record of 118° in Austin Texas on June 21, a record 45 consecutive days at or above 100° in Austin and a record 42 days at or above 105°.

Environmental Sustainability: The Landfill Gas Emissions Destruction Beneficial Use Project and integrated landfill gas wellfield full buildout with the Integrated Solar Utility significantly reduces greenhouse gas emissions and decrease reliance on fossil fuels, therein conserving natural resources. Defining the risks of climatic changes for the grid dependability to be comprised of three distinct metrics: reliability, resilience, and invulnerability. In the existing literature, definitions for these metrics vary and often overlap¹³.

9. Risks that Could Cause Delays in Project implementation

The table below describes major features, tasks, and milestones for the various stages of project implementation. The table explains how these features, tasks, and milestones will ensure either success or introduce risks that could reasonably lead to delays or interruptions in the development or implementation of a GHG reduction measure or could impact its effectiveness.

Major Feature	Task	Milestone	Success/Risks
Engineering Design	Outsourced contract design services.	Preliminary, 30%, 60%, 90% and final bid documents.	Deliverables include design specification and bid packages/Scope changes could delay implementation. This could decrease projections of reduction of GHG emissions.
Public Acceptance	Community Meetings	Statements of public or board approvals.	Public opinion could either gather support or present negative resistance that could modify the direction of the project. This could decrease projections of reduction of GHG emissions.
Permitting	Documents that describe the operational characteristics of the plants.	Submittal of permitting Core Data forms required by the TCEQ.	TCEQ Air Permitting – Registration as a Type IX Facility and Air Quality Standard Permit "Permit by Rule"/Permitting delays. This could decrease projections of reduction of GHG emissions.
Legal Challenges	Support filings for permits needed	Permit acceptance by TCEQ	Public adversity could create delays. This could decrease projections of reduction of GHG emissions.
EV Recycling Trucks	Purchase two all-electric recycling trucks for Downtown Waco.	Approval of City of Waco City Council and delivery from manufacturer.	Can increase complexity of the operational design domain and introduce risks to reliable fleet operations. Manufacturers may have supply chain shocks delaying manufacturing of vehicles. Technological changes can add costs and delay. This could decrease projections of reduction of GHG emissions.

¹³ How different power plant types contribute to electric grid reliability, resilience, and vulnerability: a comparative analytical framework K Ramirez-Meyers^{1,2,3}, W Neal Mann¹, T A Deetjen^{6,1,4}, S C Johnson¹, J D Rhodes¹ and M E Webber^{1,5}
Published 29 April 2021 • © 2021 The Author(s). Published by IOP Publishing Ltd [Progress in Energy, Volume 3, Number 3](#)Citation K Ramirez-Meyers et al 2021 *Prog. Energy*.

Major Feature	Task	Milestone	Success/Risks
Project Financing	Administer multiple contracts for engineering, construction and maintenance.	Procurement of contracts.	Budget changes and financial pressures, This could decrease projections of reduction of GHG emissions.
Power Purchase Agreements	Negotiate power purchase agreements.	Approval of various contracts.	Complexity of power sales contracts. This could decrease projections of reduction of GHG emissions.
Interconnections	Negotiate behind the metering contracts.	Approval of contracts.	Manufacturers may have supply chain shocks delaying manufacturing of vehicles. Technological changes can add costs and delays. This could decrease projections of reduction of GHG emissions.
Landfill Gas to Energy Plant	Negotiate behind the metering contracts.	Approval of contracts.	Risks to reduction in emissions could result from downsizing of plant. Construction risks include: 1-Labor shortages. 2- Procurement delays such as supply-side shortage for components. 3- Changes in the economy that impact materials and labor supply. 4- Change in work scope, Weather related impacts, 5-Force majeure, and contract disputes. 6-Flaws in manufacturing components that require re-delivery or end in product recalls. 7-Complexity and uniqueness of construction that cause communication delays.
Solar Utility Plant	Negotiate behind the metering contracts.	Approval of contracts.	Risks to reduction in emissions could result from downsizing and/or technology changes of plant. Construction risks include: 1-Labor shortages. 2- Procurement delays such as supply-side shortage for components. 3- Changes in the economy that impact materials and labor supply. 4- Change in work scope, Weather related impacts, 5-Force majeure, and contract disputes. 6-Flaws in manufacturing components that require re-delivery or end in product recalls. 7-Complexity and uniqueness of construction This could decrease projections of reduction of GHG emissions.

While any of these risks may delay progress of the work, none are considered fatal flaws to project development.

10. Conformance to PCAP's

Though the City of Waco does not currently have an EPA Phase 1 PCAP, the measures and projects described within this workplan fall well within PCAP Plans issued by the Texas Commission on Environmental Quality and the "Dallas-Fort Worth Air Quality Improvement Plan (AQIP), A Priority Climate Action Plan Deliverable – March 1, 2024; North Central Texas Council of Governments (March 1, 2024)". PCAP's referenced are included in the technical appendices to this Workplan. The following are relevant sections of PCAP and climate Action Plans that this submission has relied upon in the development of its implementation strategies and funding requests.

Climate Pollution Reduction Grants (CPRG) Planning Grants Workplan Outline for the Texas Commission on Environmental Quality (TCEQ)

TCEQ PCAP Section	Waco Workplan Subsection Described
CAP4	Section a.
Comprehensive emission inventory, emission projections, and stakeholder input will be used to identify and quantify measures that could reduce pollution with a co-benefit of carbon emission	Quantified emissions inventories and GHG emission reductions.

TCEQ PCAP Section	Waco Workplan Subsection Described
reduction. Cost-effectiveness, economic factors, and existing funding opportunities will be included for the potential emission reductions of criteria pollutants, air toxics, precursors, and carbon emissions that could be implemented. Reductions will be quantified to the extent possible using available data. Measures will be identified in each emission sector. Each identified measure will include an estimate of quantifiable emission reductions, collateral increases in emissions, key implementing agencies, implementation schedules and milestones, affected geographical areas, milestones for obtaining regulatory authority, identification of funding sources, and metrics for tracking progress. This task will include information from stakeholder engagement with local governments, state agencies, and federal partners	

Dallas-Fort Worth Air Quality Improvement Plan (AQIP), A Priority Climate Action Plan Deliverable – March 1, 2024; North Central Texas Council of Governments (March 1, 2024) (See attached CPAP in PDF in Other Attachments.)

AQIP	Waco Workplan Area Described
<p>p. 13 (Exhibit 2 “ENERGY”) <i>Also includes measures that mitigate upstream emissions from power generation through mechanisms such as on-site solar, energy storage, and/or microgrids.</i></p> <p>P. 79 Solar Technologies: <i>NCTCOG goals include drafting a plan for increased solar deployment, securing SolSmart designation for at least 10 additional municipalities, and increasing deployment of solar across all sectors while leveraging the connections between solar deployment and other regional goals such as emergency preparedness and grid resiliency.</i></p>	Subsection a.
<p>P. 84 Measure: Distributed Energy and Resilience for Public Entities <i>Resiliency elements can include battery or hydrogen fuel cell energy storage, solar, microgrids, cleaner burning generators (propane, natural gas), and electric vehicles. Developing community-scale microgrids can reduce the demand for power generated from large power plants and lessen grid demand spikes when the grid is available, as well as provide electrical power in the event of a power outage.</i> Appendix 11 (Increase Grid Resiliency for Communities) Improvements Develop community-scale renewable energy (wind, solar), microgrids, battery storage and/or hydrogen fuel cell storage, or vehicle-to grid facilities</p>	P. 5, 7, 8, 9, 10, 11 and 12.
<p>Project: Increase Grid Resiliency for Communities Public entities and utilities will collaborate to develop community-scale renewable energy (wind, solar), microgrids, battery storage, and/or hydrogen fuel cell storage, vehicle-to-grid facilities to provide power to communities in the event of a power outages.</p>	P. 5, 7, 8, 9, 10, 11 and 12.
<p>Project: Develop Emergency Shelters Public entities will identify and retrofit appropriate buildings to include resiliency elements to accommodate sheltering of the public in the event of a power outage. These buildings would accommodate many people and include building types such as community centers, large libraries, and schools. AND Appendix 11.Distributed Energy and Resilience for Public Entities Develop Emergency Shelters)</p>	P. 6, 8, and 10,
<p>P. 133 Measure Workforce Development The need for an educated, trained, and ready workforce is necessary for the continued efficiency and maintenance of the new technologies being adopted in the realms of clean energy, energy efficiency, transportation electrification, and more advanced technologies related to waste management and water treatment. This will require working with high schools, technical colleges, community colleges, universities, and industry partners to create curricula, trainings, career awareness, apprenticeships, and internships to provide the needed workforce for electric vehicles, electric vehicle charging stations, solar, wind, microgrids, weatherization services, and energy efficiency technologies.</p>	P. 9, 10, 15, 20 and 24.
<p>Landfill Gas to Energy P. 108 Project: Implement Landfill Gas Collection and Management Systems</p>	Introduction and Background. Proposed Waste to Renewable Energy Plant has a novel technological combustion system.

AQUIP	Waco Workplan Area Described
<p>There are presently several landfill gas-to-energy (LFGTE) projects at 10 landfills in the region, located among Collin, Dallas, Denton, Ellis, Johnson, and Tarrant counties. Half of these projects produce high-British thermal unit (BTU) Renewable Natural Gas (RNG) for distribution off-site and half are power generation electric. Based on data from the TCEQ MSW Annual Reports and the USEPA Greenhouse Gas Reporting Program, these projects result in more than half of the landfill gas collected in the region going to beneficial use through resource recovery (RSWMP, 2023). In 2021, resource recovery activities produced 255 gigawatt-hours of electricity for sale to the grid.</p>	
<p>Combined Heat and Power P. 99 Project: Increase On-Site Renewable Energy into Wastewater Treatment Plant Site Diversifying energy sources not only reduces emissions, it also lessens the demand on the state's energy grid. The installation of renewable energy resources at water and wastewater treatment plants supports the use of co-generation, combined heat & power, solar, hydroelectric, and wind energy in the treatment process. Appendix 12 (Increase On-Site Renewable Energy into Wastewater Treatment Plant Site). Funding would diversify energy sources at water/wastewater treatment plants by increasing the use of co-generation, combined heat & power, solar, hydroelectric, and wind energy</p>	P. 4, 5, 7, 8, 9, 10, 11 and 12.
<p>Appendix 12 Water, Wastewater, and Watershed Management Measures Measure: Improve Water and Wastewater Processes and Efficiencies Funding would diversify energy sources at water/wastewater treatment plants by increasing the use of co-generation, combined heat & power, solar, hydroelectric, and wind energy in the treatment process.</p>	P. 4, 5, 7, 8, 9, 10, 11 and 12.
<p>Appendix 13 Materials Management Measure: Upgrade Waste Disposal Facilities Projects: Implement landfill gas collection systems to optimize GHG diversion, and reuse as a renewable gas resource. Implementation of new equipment, and or upgrading existing landfill gas collection systems can reduce the need for flaring, and direct offgassing, thus reducing landfill GHG contributions.</p>	P. 6 and 18
<p>Measure: Implement Recycling & Transfer Facilities Projects: Construct Additional Recycling Centers in the Region</p>	P. 4, 5, 6, and 7

b. Demonstration of Funding Need

The City of Waco continuously evaluates capital priorities and balances those needs with critical services and Facility with available budgets. This project, if approved, would join a multi-year capital budget of nearly \$1B. The budget process evaluates the fiducial capacity to provide critical services and needed improvements to infrastructure that are both challenging and complex. The city is in a position to operate in a system that is fiscally constrained due to existing deferred / unfunded maintenance of Facility, utility lines, utility plants, streets, bridges, traffic signals, sidewalks, drainage systems, public safety radio system, etc. as well as multiple projects currently under construction. The current estimate of unfunded maintenance and replacement is more than \$2.8 billion.

With current levels of funding, the city must thoughtfully consider how its funds, there through the public trust, should be fairly and equally balanced to provide all that is needed. Grants can assist the city in developing infrastructure with sustainable and resilient resources, such as the MSW Landfill Gas to Renewable Energy and Solar Utility project that will provide the critical need of greenhouse gas reduction for decades to come.

The City of Waco has an urgent need for approval of this grant offering in order to reduce emissions from GHG, to improve the local atmosphere so it does not become a non-attainment region, to increase high tech and high paying jobs, to spur other industries and like-minded

companies who want a sustainable and resilient city and to increase climate adaptation and GHG reductions overall.

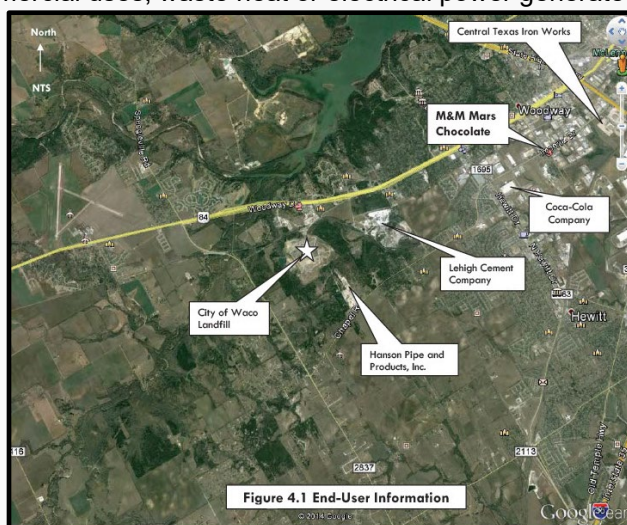
The city has aggressively pursued other grants to accomplish its goals and objectives in this project. However, many of the grant opportunities either fell outside of municipal government as a benefactor or the grants were not provided to the city. At this time, together with a nonprofit entity, the city is partnering to pursue the EPA Environmental Justice Grant. Due to submittal time limits and staff shortages, the city has reviewed many grants choosing to focus on this application preparation and need to focus on the proposed grant. Grants reviewed but not pursued due to staff shortages and need to pursue this grant include: (1) DOE Climate Resilience Grant (With Baylor University); (2) NASA Earth Science Division Climate Resilient Communities Grant; (3) NOAA Climate Resilience Regional Challenge Grant; (4) NOAA Coastal Climate Resilience Grant; (5) USBR Water Efficiency Grant; (6) Bureau of Reclamation Water Smart Grant; and, (7) FEMA BRIC Grant

The City of Waco has applied for an EPA Solar for All Grant as a subrecipient to **Texas Solar for All Coalition** application for the United States Environmental Protection Agency Solar for All grant program EPA-R-HQ-SFA-23-01 for a total amount designated for the City of Waco not to exceed \$4,000,000.00. Award information is not available at the time of this submission.

c. Transformative Impact

From 2008 up to the mid-2000, landfill gas from a compression system was part of a beneficial reuse contract with MARS Wrigley Snack Food Snackfood company located in Waco, Texas. to provide landfill gas for boiler operations at the plant in Waco. The facility was modernized, and technological improvements were made. The flow of landfill gas ceased during this period. The landfill gas was compressed and transmitted through a pipeline connection from the landfill to the plant. This facility was the cornerstone of the corporation's commitment to sustainability and they have indicated recent interest in restarting the contract. The worldwide corporation publicly commits to its sustainability plan (<https://www.mars.com/sustainability-plan>).

While this potential beneficial reuse is an important next step to a cost-effective operation, In terms of surrounding industries that would utilize the outputs from the proposed project, there are many other surrounding industries that could benefit from the planned beneficial use of landfill gas facility and the Solar Utility Plant. There is currently a half-dozen or more surrounding industries that could beneficially use the landfill gas, supply to a nearby pipeline for commercial uses, waste heat or electrical power generated. (See map below)



The map above provides nearby potential users. Notwithstanding the beneficial reuse that exists currently, by provisioning these plants with beneficial reuse of landfill gas and the Solar utility, the financial structure of the operating plants has already proven profit worthy. Achieving lower carbon

emissions in the United States requires developing many renewable energy Facility, including renewable waste-to-energy. solar and wind, at a rapid pace. Renewable energy projects have the capacity to spur economic growth and create job opportunities within local communities. From the construction and operations, these Facility benefit the environment and community. By using solar and renewable energy this helps reduce the dependence on non-renewable resources and has a positive impact on the environment and planet.

Section 2: Impact of GHG Reduction Measures

Integral to the reduction of GHG emissions is the unique synergy of the landfill gas destruction beneficial use, Solar Utility and full buildout of the landfill gas wellfield. The Solar Utility includes a technologically advanced geomembrane cover. Landfill cap covers are one of the key components of modern landfills as they prevent uncontrolled water infiltration and diffuse biogas emissions. The role of the landfill cover in mitigating greenhouse gas (GHG) emissions from landfills is essential. Therefore, the landfill gas wellfield, Solar Utility and landfill gas destruction and beneficial facility act synergistically to dramatically reduce GHG emissions¹⁴. The combined calculations for GH reductions for methane and carbon dioxide are presented in this documentation. Incorporation of geosynthetic materials, such as geomebranes are key components for GHG emission reductions.¹⁵

Provided below are quantitative totals of estimated GHG emission reductions. Emission reductions were calculated using “Emission Reductions and Environmental and Energy Benefits for Landfill Gas Energy Projects”, (US EPA Landfill Methane Outreach Program, updated May 2023) provided as a technical appendix to this workplan. This calculator estimates the direct methane, avoided carbon dioxide and total GHG reductions attributable to an LFG energy project for the current year, calculated from the project size entered by the City of Waco project described in this workplan. Estimates are calculated for two types of LFG energy projects: (1) Electricity and (2) Direct-use. For electricity projects, the national average values were used.

Additional information about the AVERT regions and national average value as well as equations and references for all calculations are included in the technical appendix (US EPA Landfill Methane Outreach Program, updated May 2023). CO₂ and Methane are the greenhouse constituents that have the most long-lasting climatic impacts, although landfill gas has various NMOC's including acrylonitrile, benzene, 1,1-dichloroethane, 1,2- cis dichloroethylene, dichloromethane, carbonyl sulfide, ethylbenzene, hexane, methyl ethyl ketone, tetrachloroethylene, toluene, trichloroethylene, vinyl chloride, and xylenes. A laboratory analysis of the landfill gas is shown below of GHG constituents.

The workplan focus of the estimated GHG reductions is based on carbon dioxide and methane. Greenhouse gases are calculated Per 40 CFR §98.323(b)¹⁶ CH₄ MT CH₄ is calculated using the following equation but on a daily basis instead of weekly. The formula used is:

¹⁴ https://www.researchgate.net/publication/329775464_Influence_of_landfill_cap_cover_characteristics_on_the_mitigation_of_GHG_emissions

¹⁵ AVAILABLE AND EMERGING TECHNOLOGIES FOR REDUCING GREENHOUSE GAS EMISSIONS FROM MUNICIPAL SOLID WASTE LANDFILLS: EPA, Office of Air and Radiation; June 2011

¹⁶ 40 CFR § 98.323 - Calculating GHG emissions.

$$CH_{4D} = \sum_{i=1}^n \left(V_i * MCF_i * \frac{C_i}{100\%} * 0.0423 \frac{520^{\circ} R}{T_i} * \frac{P_i}{1 atm} * 1,440 * \frac{0.454}{1,000} \right) \quad (\text{Eq. FF-3})$$

Where:

CH_{4D} = Weekly CH_4 liberated from the monitoring point (metric tons CH_4).

V_i = Measured volumetric flow rate for the days in the week when the degasification system is in operation at that monitoring point, based on sampling or a flow rate meter (acfm). If a flow rate meter is used and the meter automatically corrects to standard temperature and pressure, then use scfm and replace " $520^{\circ} R / T_i \times P_i / 1 atm$ " with "1".

MCF_i = Moisture correction factor for the measurement period, volumetric basis.

= 1 when V_i and C_i are measured on a dry basis or if both are measured on a wet basis.

= $1 - (f_{H_2O})_i$ when V_i is measured on a wet basis and C_i is measured on a dry basis.

= $1 / [1 - (f_{H_2O})_i]$ when V_i is measured on a dry basis and C_i is measured on a wet basis.

$(f_{H_2O})_i$ = Moisture content of the CH_4 emitted during the measurement period, volumetric basis (cubic feet water per cubic feet emitted gas).

C_i = CH_4 concentration of gas for the days in the week when the degasification system is in operation at that monitoring point (%).

n = The number of days in the week that the system is operational at that measurement point. To obtain the number of days in the week, divide the total number of hours that the system is operational by 24 hours per day.

0.0423 = Density of CH_4 at $520^{\circ} R$ ($60^{\circ} F$) and 1 atm (lb/scf).

$520^{\circ} R$ = 520 degrees Rankine.

T_i = Temperature at which flow is measured ($^{\circ} R$).

P_i = Absolute pressure at which flow is measured (atm).

1,440 = Conversion factor (minutes/day).

0.454/1,000 = Conversion factor (metric ton/lb).



The following table shows the total historic gas collection flared from 2017 through 2021, with 2017 through 2019 being the last three years the gas system was operated by a private entity prior to the City taking over operations. This data is provided in % methane ($CH_4\%$), standard cubic feet (scf), metric tons (MT) CH_4 , MT carbon dioxide equivalent (CO_2e), and Tons CO_2e . Historical GHG Emissions Reductions are:

Year	CH_4 %	Collected (scf)	Methane Emissions Based on Modeled Generation			Methane Emissions Based on Recovery Efficiencies		
			MT CH_4 (Methane Generation Estimate for 2021 no oxidation)	MT CH_4 (CH_4 Emissions Corrected for Oxidation)	MT CO_2e	MT CH_4 (Collected and routed to control device)	MT CH_4 (CH_4 Generation Calculated from Collection Efficiency)	MT CO_2e
2017	56.8%	185,726,436	9,926.38	7,44.79	223,343.47	2,024.83	3,265.67	81,641.75
2018	54.8%	149,858,475	10,200.17	7,650.13	229,503.93	1,576.22	2,534.60	63,365.00
2019	55.9%	147,003,525	10,495.84	7,871.88	236,156.38	1,578.84	2,408.82	60,220.50
2020	49.3%	173,614,957	10,794.99	8,096.24	202,406.00	1,644.31	4,326.95	108,173.75
2021	50.5%	381,534,405	11,044.01	8,283.01	207,075.25	3,702.68	8,210.39	205,259.75

The increase in collected landfill gas is due to technological upgrades to the system when the city took over operations in 2020. With system upgrades completed, the annual collection and flared (based on 2021 metric tons of CH_4) has increased by approximately 115% when compared to the average collection and flared in 2017 through 2019. As the wellfield is expanded by the Year 2025, the amount of gas collected and flared will increase by as much as another 200% and more.

According to the US Department of Energy's Energy Information Administration, the nation averaged 0.85 pounds of carbon dioxide emissions per kilowatt hour generated. Thus, an average 400 W solar panel generating 1.5 kWh per watt per year* will offset 510 pounds of carbon dioxide emissions. A single acre of solar panels with a capacity of 1 MW can be expected to offset more carbon emissions than 38,750 trees. Emission reductions for the solar utility plant of up to 10-acres represents a total of the offset of emissions of 65,500 trees. To produce the expected 1MW output capacity. It is estimated the CO_2e offset will be 1,250 tons/year. According to the Lawrence Berkeley National Laboratory, utility-scale solar power produces between 394 and 447 MWh per acre per year¹⁷. Thus, an acre of solar panels installed to replace natural gas reduces approximately 208 to 236 times more carbon dioxide per year than an acre of forest.

¹⁷ <https://emp.lbl.gov/utility-scale-solar/>

a. Magnitude of GHG Reductions from 2025 through 2030, and 2030 to 2050

The following are quantifiable outcomes listing GHG reductions because of CPRG implementation grant funding:

Implementation Measure	MT CH ₄	MT CO ₂ e
Landfill Gas Wellfield to Full Extent 2025 to 2030 Emissions Avoided	65,184	410,260
Landfill Gas Wellfield to Full Extent 2030 to 2050 Emissions Avoided	187,734	8,205,200
Landfill Gas Emissions Destruction Beneficial Use plant 2025 to 2030	0	0
Landfill Gas Emissions Destruction Beneficial Use plant 2030 to 2050**		31,250
C & D Diversion 2025 to 2030 ¹⁸		419
C & D Diversion 2030 to 2050		1,796
Recycling Diverted 2025 to 2030 ¹⁹		34,239
Recycling Diverted 2030 to 2050 ²⁰		171,197
EV Recycling Trucks 2025 to 2030 ²¹		4,750
EV Recycling Trucks 2030 to 2050		19,000
Propane Powered Backup Generators (Diesel generators emit 20.3 MT CO ₂ for 4 generators) ²² 25 Years		17.4
CO ₂ emissions diverted annually EV Charging Stations ²³ 25 Years (26,180 2025 to 20300; (104,720 2030 TO 2050)		104,650
Solar Utility 2030 to 2050*	n/a	31,250
Total MT CH₄ Methane Reduction 2025 to 2030	65,184	
Total MT CH₄ Methane Reduction 2030 to 2050	187,734	
Total MT CO₂ Carbon Dioxide Reduction 2025 to 2030		470,598
Total MT CO₂ Carbon Dioxide Reduction 2030 to 2050		8,543,430

* The Solar Utility plant which is planned for 10-acre of the 237-acre closed landfill would produce 1 MW, in its' startup year of 2030 would result in resulting in 1,250 tons CO₂e.

**Total avoided CO₂ emissions

In terms of the durability and lasting effects of the GH reductions, they will continue as long as the landfill produces landfill gas, estimated to be at least 25 years. The Solar Utility will last as long as the system components continue to function according to specifications and could be subject to component renewal and or replacement due to normal wear and tear. Twenty-five-year warranties are typical.

b. Cost Effectiveness of GHG Reductions

The City of Waco procured a Landfill Gas-to-Energy Feasibility Study, prepared by SCS Engineers dated May 2016. This study analyzed the feasibility of a number of alternative uses of the landfill gas including direct and indirect uses such as sale of electrical power through generation of electricity by LFG waste to energy engines, sale of excess heat, sale of treated landfill gas and combinations of those.

Evaluating several proformas, another SCS study "Landfill Gas-to-Energy Feasibility Study, May 16, 2016 concluded: *"The conclusion from these pro formas is that a power generation project is financially feasible at the Landfill"* .

While various authors have estimated the cost of social – CO₂ emissions values, the calculations below provide the estimated cost due to the cost of the specific grant request facilities and measures.

The existing feasibility studies have proven the cost-effectiveness of the system. Individual

¹⁸ The total carbon-emission-saving potential can be increased from 0.31 million t CO₂-e (2022) to 0.35 million t CO₂-e (2031). Estimating the Carbon Emission of Construction Waste Recycling Using Grey Model and Life Cycle Assessment: A Case Study of Shanghai July 19, 2022; Huang, editor

¹⁹ Assessing the environmental impact of waste management: A comparative study of CO₂ emissions with a focus on recycling and incineration, Journal of Cleaner Production; August 2023

²⁰ City_of_Waco_GHG Waste Reduction Calculator warm_v15_nov2020 Excel Model

²¹ Battery electric could be 63% of refuse truck sales come 2030: report; by Maria Rachal, published in WasteDive, January 31, 2023.

²² Diesel generators produce particulate matter (PM), volatile organic compounds (VOCs), nitrous oxide (NOx) among other harmful pollutants that create smog and exacerbate respiratory conditions. FEA "The Carbon Footprint of Diesel Generators" <https://www.feace.com/single-post/the-carbon-footprint-of-diesel-generators>

²³ Reuters: "Lifetime Carbon Emissions of Electric Vehicles vs Gasoline Cars: July 7, 2021: <https://www.reuters.com/business/autos-transportation/lifetime-carbon-emissions-electric-vehicles-vs-gasoline-cars-2021-06-29/>

cost effectiveness is located in the “Budget Narrative” attached as a part of this submittal. The total grant request costs is \$56,825,701, including initial start-up costs. In terms of overall MT GHG, the following calculations are provided:

<u>TOTAL COSTS:</u> \$56,825,701	Waco	GIVE Model*	EPA**
<u>2025 to 2030 Cost/MTCh₄</u>	\$871.8		
<u>2025 to 2030 Cost/MTCO₂</u>	\$302.7	\$44	\$230
<u>2025 to 2030 Cost/MTCO₂</u>	\$120.8		
<u>2030 to 2050 Cost/MTCO₂</u>	\$6.65	\$413	\$308

*In a study of *Nature*, the social costs – CO₂ were estimated at \$185 per ton of CO₂ (\$44–\$413 per ton CO₂: 5%–95% range, 2020 US dollars) at a near-term risk-free discount rate of 2% and were based on the Greenhouse Gas Impact Value Estimator (GIVE) model²⁴

** The EPA has estimated the social costs at 2030 and 2050 at the 2% near term rate.²⁵

The measures greatly demonstrate that carbon dioxide is cost effectively controlled and the methane metrics are comparable. The measures proposed in this grant application reflect the anticipated social-cost benefits.

c. Documentation of GHG Reduction Assumptions

The process of decomposition of landfill waste materials into greenhouse gases has been well documented, including numerous studies at the MSW 948A landfill.

The differences between uncollected landfill gas and flared landfill demonstrates that uncollected landfill gas emits 8 times more CO₂eq than landfill gas that is flared. While flaring is a viable and proven means to destroy the components of landfill gases, the efficiency of destruction thought by manufacturers claims are not always accurate. This is the very genesis of the novel waste combustor technology for the landfill gas destruction beneficial use plant that will be employed to effectively treat and reduce emissions from landfill gas. The efficiencies of the landfill gas that is destructured in the advanced combustion system will be both modeled and field-tested resulting in a significant source of data that will be transferrable to the U. S. and global industry.

The Technical appendix (GHG Emission Calcs) to this workplan demonstrates the reasonableness of the GHG emission reduction estimates. The technical appendix explains the methodology and assumptions used. For each GHG reduction measure, the quality, thoroughness, reasonableness, and comprehensiveness of the methodology, assumptions, and calculations described for developing the estimated GHG emission reductions are included that use the latest available information, including the latest enacted federal, state, tribal, territorial, local, and/or other requirements and policies.

Section 3: Environmental Results – Outputs, Outcomes, and Performance Measures

a. Expected Outputs and Outcomes

The scientific consensus clearly shows climate change is associated with increasingly frequent and intense natural disasters ranging from droughts and wildfires to hurricanes and coastal flooding. Climate change is a long-term, intergenerational problem, with carbon dioxide in the atmosphere persisting for hundreds to thousands of years. Thus, technological advances, such as that posed by the proposed Facility, is an innovation central to longer-term efforts to mitigate climate change by developing alternatives to fossil fuels.

The novel combustion technology and plant facilities combination will steeply reduce emissions and further lead to a long-term lowering of the cost of reducing emissions, net-zero emission, in the future. Air quality improvements resulting from a worldwide reduction in greenhouse gas emissions would benefit human health and prevent economic losses, according to new research by scientists from NASA, Duke University, and Columbia University²⁶.

²⁴ Rennett, K., Errickson, F., Prest, B.C. *et al.* Comprehensive evidence implies a higher social cost of CO₂. *Nature* **610**, 687–692 (2022). <https://doi.org/10.1038/s41586-022->

²⁵ Report on the Social Cost of Greenhouse Gases: November 2023; United States EPA

²⁶ Temporal and spatial distribution of health, labor, and crop benefits of climate change mitigation in the United States; Research article published in Earth, Atmospheric and Planetary Sciences; November 1, 2021; <https://doi.org/10.1073/pnas.210406111805224-9>

As performance-based technology, the efficiencies of the landfill gas flared by the Novel Waste-to-Renewable Energy plant will be both modeled and field-tested resulting in a significant source of data that will be transferrable to the U. S. and global industry. These results would be published and made publicly available.

Expected short- and long-term outputs and outcomes for methane and carbon dioxide will demonstrate direct reductions. As landfill gases contain NMOC's, reductions both short- and longer-term are reasonably expected to have direct co-pollutant (e.g., CAPs and/or HAPs) emissions reduced in the general and in low- income and disadvantaged communities as expected outcomes.

b. Performance Measures and Plan

Proposed performance measures that have already been implemented per the Greenhouse Gas Reporting Program under 40 CFR. This includes both monitoring and reporting annually. The landfill gas destruction beneficial use plant resultant emissions will be both modeled and field-tested. This will evaluate concentrations of flared gases with results of each GHG reduction documented. This data is required along with the air permitting requirements by the state and EPA.

c. Authorities, Implementation Timeline, and Milestones

In terms of authorities, municipal landfills in Texas operate under various Air Permits and operating standards as prescribed under Texas and EPA rules and regulations. Reports are submitted at least on an annual basis. These are administered by the Texas Commission on Environmental Quality and the United States Environmental Protection Agency for greenhouse gas reporting. These reports, submitted at least annually, are maintained as part of the Operating Record and recordkeeping for this project if approved by EPA. Permits will be required by the Texas Commission on Environmental Quality, Air Permitting Division, who will also issue Title V and General Operating Air Permits. Reports of Greenhouse Gas Emissions are transmitted to the United States Environmental Protection Agency through the e-GGRT platform. Project Description, milestone years and costs are provided in the table following and in the Budget Narrative.

Implementation Timelines and Milestones

Description	Milestone - Year	Cost
Landfill Gas Wellfield Full Buildout	Start 2024 Complete 2025	\$4,303,530
Citizens Collection Station	Start 2024 Complete 2026	\$5,573,600
Enhanced Recycling using EV Recycling Trucks	2024-2025	\$3,014,000
EV Charging Stations	2024-2025	\$6,855,587
Community Center Natural Gas-Powered Emergency Generators	2024-2025	\$3,763,200
1.4MW Solar Utility System	2025-2029	\$24,945,760
Reporting, Tracking and Coordination with Planning Grant Awardees and, High-Quality Workforce Training	Ongoing 2024-2029	\$1,000,030
First Year Startup and Job Training	2028-2029	\$1,240,470
Administration and Budget Control	Ongoing 2024 - 2029	\$6,129,524

**Total:
\$56,825,701**

Section 4: Low-Income and Disadvantaged Communities

a. Community Benefits

Due to favorable position in community population growth statistics, access to technical colleges and universities for trade training, and overall need for a need of additional, sustainable and resilient sources of energy, the City of Waco is well positioned to be a success in this implementation: *“Energy has been an important part of the Texas economy for more than a century and will continue to be a key export industry as the need for conventional fuels*

is projected to persist for decades. In addition to vast deposits of oil and natural gas, the state has more recently become a leader in renewable energy (primarily wind and solar) and emerging areas such as hydrogen and carbon capture.” Ray Perryman: Younger Labor Force positions Texas economy well. Waco Tribune Herald, December 25, 2023

Included in the Technical Appendices is the document containing the required list of the CEJST Census tract IDs or EPA’s EJScreen Census block group IDs and name of the relevant jurisdiction (e.g., city, town, etc.) for areas that are affected by the proposed GHG reduction measures (Areas_CityofWaco.xls).

Although there are many direct benefits as previously stated (air quality, job creation, workforce development, etc.), there are also many indirect benefits because of this grant. Those direct and indirect benefits not previously covered are (1) direct and indirect benefits from mitigating climate impacts (e.g., reduced risk of wildfires, drought, and extreme weather events); (2) increased resilience to climate change from GHG reduction measures that have both GHG reduction benefits and climate adaptation benefits; (3) improved public health resulting from reductions in co-pollutants, less visits to emergency rooms, and less occurrences of asthma and related health conditions; (4) creation of high-quality jobs and new workforce training opportunities in low-income and disadvantaged communities; and, (5) maintaining or lowering energy costs and improved energy resilience for disadvantaged communities.

The projects in the grant request will not only create high-quality workforce development activities tied to engineering and construction, but also to lower income and disadvantaged communities. The construction and operation spurs workforce development and is a community benefit through its creation of equitable career pathways and training opportunities. Specifically, this includes preparing individuals for high-quality, middle-skill career pathways that enable economic mobility, rather than short-term, low-wage jobs. In alignment with [Executive Order 14082: Implementation of the Energy and Infrastructure Provisions of the Inflation Reduction Act of 2022](#), the City of Waco is in support of the creation of high-quality, family-sustaining jobs with the free and fair choice to join a union (such as the Pipefitters Union for the Landfill Gas Emissions Destruction Beneficial Use Plant). This includes an emphasis on the quality of jobs, not just the number of jobs created by these federal investments. Specific strategies to ensure CPRG implementation grant funds and the implementation of the GHG reduction measures generate high-quality jobs with a diverse, highly skilled workforce and support “high road” labor practices are: (1) Job Fairs that target high school and Technical Trade Schools, such as Texas State Technical College in Waco, Texas that offers programs in Electrical Lineworker and Management Technology; (2) Robotics; (3) Industrial Systems; (4) Instrumentation Technology; (5) Plumbing and Pipefitting Technology; (6) Electric Power Control and Electromechanical Technology; and more that specifically include the measures and infrastructure requested in this grant. The Beneficial Use Landfill Gas to Energy Plant, Solar Utility, Recycling Center, EV Recycling Trucks and Community Center Propane Generators create multiple high tech, high paying jobs within the community from either the planning, design, construction, permitting and operation. Jobs will include engineering specialties for design, construction jobs, equipment manufacturing jobs, vendors, utility technicians, and increased employment for the end users of the products of this project.

b. Community Engagement

The projects have been discussed at a number of outreach events to gauge public support and provide a meaningful way to engage people that will have an opportunity to participate in decisions about activities that may affect their environment and/or health; the public's contribution can influence the regulatory agency's decision; community concerns will be considered in the decision-making process; and, decision makers will seek out and facilitate the involvement of those potentially affected. Throughout the course of the Year 2023, the staff of the Sustainability Division held 50 events.

Non-Profits	Conferences	Environmental Action Groups	Community Workshops	Events
Waco Sustainability Network	Green Communities Conference	Sustainable Action Work Group	City of Waco "City Academy"	Green Champion events
Keep Waco Beautiful		MPO Connected & Automated Work Group	Urban REAP Community	Care for Waco Carnival
Live Well Waco Coalition		MPO Bike & Pedestrian Work Group	Water Quality Community	Mayborn Museum STEMfest
			Bike to Work Community	Green Youth Camp at Wetlands
Keep Waco Beautiful River Cleanups			Farmers Markets Promotions of Sustainability Opportunities and Workshop	Informal Learning Network lunches
Waco Youth Council			Hunger Free Community Coalition	NWIAA Inclusion lunches
			Air Collaborative Workshop	Baylor Community Garden

Many of these meetings occur in neighborhoods that include multi-cultural and disadvantaged communities. Input by low-income and disadvantaged communities form the basis for the grant request as many struggles with the high cost of energy and desire a better-quality environment that benefits their health.

A letter of wider letter of community support is included in the "Other Attachments Form" from Congressman Pete Sessions, and a Waco City Council Resolution affirming City Council support are included.

Section 5: Job Quality

Renewable waste to energy sector jobs embodies engineering, manufacturing, construction, technicians, clerical and office workers, scientists and operations roles, allowing opportunities for both skilled and unskilled (but trainable) work forces. Transferable experience and skills can be brought across from most other heavy process plants because of the similarity between equipment, procedures and processes. Industry experience in mission critical sectors such as pharmaceuticals, power plants, and data centers create job opportunities for those worker classes to be available for hire in the commissioning and installation of energy from waste plants.

With that as a background, the projects and measures described would generate high-quality jobs with a diverse, highly skilled workforce and support "high road" labor practices. Work at the facilities will support the creation of high-quality, family-sustaining jobs with the free and fair choice to join a union. This will apply to vendors, outsourced contracts, contractors, consultants and others who would participate in the implementation of this facility. Strategies include but are not limited to: (1) prevailing wages for at least the median area income for all workers. (2) requiring contractors and subcontractors, to provide family-sustaining benefits and retirement contributions; (3) Incorporating labor and job quality standards into procurement activities; (4) health and safety plans that are developed in conjunction with workers, including anti-harassment training for workers and management, OSHA training to minimize workplace hazards (e.g., OSHA 10 and OSHA 30), and supplemental health and safety training as needed.

Section 6: Programmatic Capability and Past Performance

a. Past Performance

The following table lists federally funded or non-federally funded assistance agreements that the City of Waco is either currently performing or has performed within the last three years.

Project Title	City of Waco Council Resolution Acceptance Number	Funding Agency	Description	Contact Information
Airport Improvement Program	RES 2023-588 grant number 3-48-0220-050-2023	United States Department of Transportation, administered by the FAA.	Appropriating the funds for use in accordance with the grant contract the amount of \$124,730.00	Mr. Joel Martinez, Director of Aviation, City of Waco, Texas Ph. 254-750-8657
Bus and Low- and No-Emission Grant Program	RES-2023-957 Federal Section 5339 competitive grant	Federal Transit Administration	For the purchase of replacement fleet to be used by Waco Transit System for day-to-day operations, in an amount not to exceed	Ms. Serena Stevenson General Manager Waco Transit 254-750-1919

Project Title	City of Waco Council Resolution Acceptance Number	Funding Agency	Description	Contact Information
			\$3,133,129.00 from the Fiscal Year 2023 award allocation with local match requirements not to exceed \$546,343.00; for a total increase in appropriations of \$3,679,472.00.	
Public Health Emergency Preparedness Program	RES-2023-274 grant contract (No. 537-18-0150-00001)	Texas Department of State Health Services		Ms. LaShondra Malrey-Horne Director of Public Health 254-750-5459
The American Rescue Plan Act		State of Texas and Local Fiscal Recovery Funds	Funding totaling \$34.7M was provided to the City of Waco for numerous city operations and funds.	Mr. Nicholas Sarpy Chief Financial Officer – Fiscal Management services 254-750-5694

In October 2023, City of Waco and Baylor University were awarded an NSF Grant for \$1M to pilot test the Climate-Smart, Waste-Energy Combustor (CSWEC) at the City Landfill existing Landfill Gas Flaring Station that has 1) near-zero emissions, 2) maximum energy capture, and 3) ability to burn a wide variety of gasses and oils from various waste sources that current systems can't effectively handle. CSWEC cleanly destructs landfill methane, and, with minimal processing, transforms a wide variety of waste into ultra-clean energy.

b. Reporting Requirements

Progress Reports. Semi-annual progress reports and a detailed final report will be prepared summarizing technical progress, accomplishments, and milestones achieved including a description of outputs and outcomes, planned activities for the next six months, and a summary of expenditures to date.

One year after grant award. As part of the second semi-annual progress report, inclusive is a summary that quantifies benefits to low-income and disadvantaged communities. This report will also provide an update on ongoing and planned community engagement.

Final report. Shall be submitted to EPA within 120 calendar days of the completion of the period of performance. The final report must include a summary of the GHG reduction measures implemented, outputs and outcomes achieved, and costs of the measures. In addition, the final report shall report the total GHG emissions and other pollutants reduced (in general and in low-income and disadvantaged communities), provide a summary of community engagement, and discuss the problems, successes, and lessons learned from the implementation of the GHG reduction measures that could help overcome structural, organizational, or technical obstacles to implementing a similar project elsewhere.

Performance Measures.

Goal: Mitigate Emissions that Contribute to Climate Change						
Objective: Reduce Emissions						
Annual Performance Goal	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
Metric: CH4 Emissions	16,400	14,350	12,300	10,250	8,200	6,1500
Metric: CO2e Emissions	437,281	393,523	354,198	318,7788	286,900	258,210
Goal: Decisive Actions to Advance Environmental Justice to Disadvantaged and Underserved Communities						
Objective: Reduce Emissions						
Annual Performance Goal	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
Metric: Conduct outreach events to target disadvantaged communities	4	4	6	6	8	8
Work with Cooper Foundation who distributes grants to non-profits, as they are applying the Environmental Justice Grant for environmentally related issues.	Application	Receive Funding				
Goal: Track Consultant/Contactor Performance, Schedules and Expenditures						
Objective: Assure Performance Target are Met						
Annual Performance Goal	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030

Tasks Reported	14	14	14	14	14	14
Tasks Completed	1	4	6	8	10	12

Measure: Reporting, Tracking and Coordination with Planning Grant Awardees and, High-Quality Workforce Training: \$1,000,030

Expected Community Benefits:

Increased Awareness and Understanding.

Expected Outcomes:

Semi-Annual, Annual and Final Reporting, attendance at stakeholder meetings, interagency meetings and coordination with Planning Awardees, University and college communication, miscellaneous tasks intrinsic to the grant request. Workforce Training through local technical trade schools and colleges.

These projects will create jobs within the local disadvantaged communities from skilled, semi-skilled to labor class, significantly reduce greenhouse gases, add resilience to the grid, defer use of fossil fuels to generate power, add renewable energy and improve the local air quality and climate.

c. Staff Expertise

The City of Waco staff that will administer staff and/or directly work on this Facility include; Mr. Bradly Ford, City Manager, Mr. Paul Cain, PE Assistant City Manager, Mr. Nicholas Sarpy Chief Financial Officer, Mr. Charles A. Dowdell, MS, PG, CEG Chief Sustainability Officer, Mr. Kody Petillo, PE, Director of Solid Waste Services, Vickie Halfmann, Grants Coordinator, Mr. Eric Coffman Sustainability Programs Manager, and Olivia Rome Environmental Compliance Coordinator. The Resiliency and Sustainability Division works with Fiscal Management services and the City of Waco Grants Administrator on tracking expenditures and compliance with grant conditions.

The principal staff liaison will be Mr. Dowdell who has over 51 years in the solid waste industry, including expertise in permitting, construction, operations and multiple industry sectors including waste collection, hazardous and municipal waste operations, landfill gas, landfill gas to energy, and waste to energy. He is experienced with both national and state agencies and the administration of numerous grants. Biographical sketches, including resumes or curriculum vitae for key staff, managers, and any other key personnel are included as a "Project Team Biography" attachment.

Section 7: Budget

7. Budget and Timely Expenditure of Grant Funds

- Budget Detail.** A complete detailed budget for each GH Measure and proposed facility is included in the Budget Narrative attached to this grant application. The proposed budget provides a detailed breakout by funding type in the proper budget category for each activity for which the funding is requested.
- Expenditure of Awarded Funds.** If awarded the grant, the City of Waco will follow the guidelines listed in "Managing a Grant, published by EPA, and specifically the Office of Management Budgets requirements²⁷. These include filing financial reports, disclosure of all expenditures, submitting progress reports, documentation of all environmental sampling and analyses, documentation of contractor's performances, documentation and recording of supplies and minor services, and support costs of the City of Waco personnel and administration.

Reasonableness of cost is included in the Budget Narrative attached to this application.

²⁷ [Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards](#) regulations; Code of Federal Regulations (CFR) Part 200, December 2014.