



TULSA METROPOLITAN AREA CLIMATE POLLUTION REDUCTION GRANT PRIMARY CLIMATE ACTION PLAN



Prepared by Indian Nations
Council of Governments
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DEFINITIONS AND ACRONYMS

ORGANIZATIONS

Indian Nations Council of Governments (INCOG) - A voluntary association of local and tribal governments in the Tulsa metropolitan area in northeast Oklahoma. INCOG provides planning and coordination services for member governments in areas such as comprehensive planning, transportation, community and economic development, environmental quality and energy programs, public safety, and services for older adults. INCOG serves Creek, Osage, Rogers, Tulsa, and Wagoner counties, more than 50 cities and towns located in those counties, and the Cherokee, Muscogee, and Osage Nations.

INCOG Office of Energy and Environmental Sustainability - A department of INCOG that works with state and federal governmental agencies to implement clean water, air quality, and energy programs for the Tulsa region.

Oklahoma Department of Environmental Quality (ODEQ) - A department of the State of Oklahoma that serves as the primary environmental protection agency to administer the State's environmental laws and delegated federal programs that protect Oklahoma's air, land, and water resources, and to administer programs related to sources of ionizing radiation.

The M.e.t. - The Metropolitan Environmental Trust is a Tulsa regional non-profit governmental trust that provides environmental education and solid waste diversion programs.

Association of Central Oklahoma Governments (ACOG) - A voluntary association of local and tribal governments in the Oklahoma City metropolitan area in Central Oklahoma.

PROGRAMS

Climate Pollution Reduction Grant (CPRG) - An Environmental Protection Agency (EPA) program enabled by the 2021 Bipartisan Infrastructure Law that provides grants to states, local governments, tribes, and territories to develop and implement plans to reduce greenhouse gas (GHG) emissions.

Tulsa Air Quality Program - A program of the INCOG Office of Energy and Environmental Sustainability funded by the Federal Highway Administration (FHWA) through the Congestion Mitigation and Air Quality (CMAG) grant that assists the region to maintain its federal air quality attainment designation, which helps sustain clean air and keep economic development unimpeded.

Ozone Alert! Program - A sub-program of the INCOG Office of Energy and Environmental Sustainability Air Quality Program that sends alerts to residents in the Tulsa region about ozone levels are above a health-affecting threshold. These alerts encourage residents to take action to reduce emissions that form ground-level ozone.

Tulsa Area Clean Cities Program - A U.S. Department of Energy designated Clean Cities coalition serving to increase energy security, reduce fleet operating costs, and improve the environment across eastern Oklahoma by working locally to advance affordable domestic transportation fuels, energy efficient mobility systems, and other fuel-saving technologies and practices.

TOOLS

Motor Vehicle Emission Simulator (MOVES) - An emissions modeling system from EPA that estimates emissions for mobile sources at the national, county, and project level for criteria air pollutants, greenhouse gases, and air toxics.

Avoided Emissions and Generation Tool (AVERT) - An EPA tool that evaluates how energy policies and programs, such as energy efficiency, renewable energy, and electric vehicles lead to changes in emissions of particulate matter and greenhouse gases from electric power plants at a county, state or regional level.

Alternative Fuel Life-Cycle Environmental and Economic Transportation Tool (AFLEET) - A tool developed by Argonne National Laboratory that helps estimate petroleum use, greenhouse gas and other pollutant emissions.

Climate and Economic Justice Screening Tool (CEJST) - A tool that identifies Census Tracts that are overburdened and underserved based on demographic characteristics.

EPA EJ Screen - A tool produced by the EPA to identify areas considered environmental justice areas based on socioeconomic factors.

TERMINOLOGY

Metropolitan Planning Organization (MPO) - A federally mandated and federally funded transportation policy-making organization made up of representatives from local governments and governmental transportation authorities tasked with ensuring regional cooperation in transportation planning. Federal funding for transportation projects and programs are channeled through this planning process.

Council of Governments (COG) - A voluntary association of elected public officials representing local governments within an urban or metropolitan area. Their purpose is to establish a consensus about the needs of a regional area and the actions needed to solve local and inter-local problems.

Metropolitan Statistical Area (MSA) - A geographic entity based on a county or a group of counties with at least one urbanized area with a population of at least 50,000 and adjacent counties with economic ties to the central area. The economic ties are measured by commuting patterns.

Lead Organization - The organization identified to manage grant funds and oversee the climate pollution reduction grant (CPRG) plan development process.

Primary Climate Action Plan (PCAP) - As required by EPA as a part of the CPRG application process, a plan that includes a focused list of near-term, high priority implementation-ready measures to reduce greenhouse gas (GHG) pollution.

Comprehensive Climate Action Plan (CCAP) - As required by EPA as a part of the CPRG application process, an in-depth expansion of the components of the PCAP meant to establish both near- and long-term greenhouse gas emission reduction goals, strategies, and measures.

Greenhouse Gas (GHG) - A gas that contributes to the greenhouse effect by absorbing infrared radiation, including carbon dioxide, chlorofluorocarbons, methane, ozone, nitrous oxide, and water vapor.

US Census Areas of Persistent Poverty and Historically Disadvantaged Communities - A census tract with a poverty rate of 20% or more for four consecutive time periods, about 10 years apart, spanning approximately 30 years.

1. INTRODUCTION

1.1 CPRG Overview

The EPA's Climate Pollution Reduction Grant (CPRG) initiative allocates \$5 billion in grants to support states, local governments, tribes, and territories in crafting and executing robust strategies to curtail greenhouse gas emissions and mitigate adverse air pollution. Authorized under Section 60114 of the Inflation Reduction Act, this dual-phase initiative allots \$250 million for noncompetitive planning grants and around \$4.6 billion for competitive implementation grants.

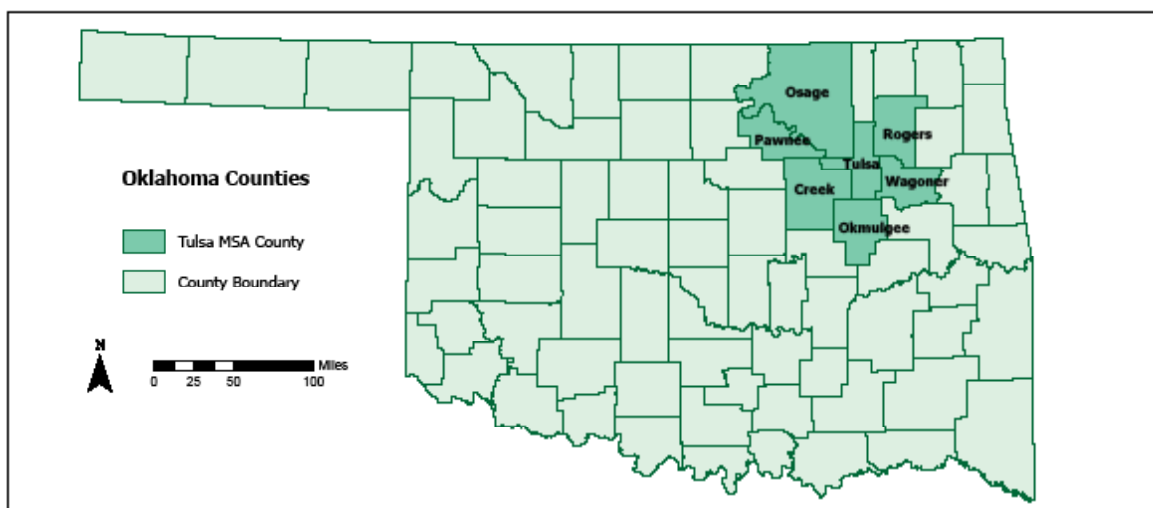
The Indian Nations Council of Governments (INCOG) was designated as the Lead Organization representing the Tulsa Metropolitan Statistical Area's (MSA) participation in the CPRG program by the INCOG governing body on March 14th, 2023. INCOG is the Tulsa region's Metropolitan Planning Organization (MPO) and Council of Governments (COG), and five of the seven counties included in the Tulsa MSA are member organizations: Tulsa, Osage, Creek, Rogers, and Wagoner counties. The two counties within the Tulsa MSA that are not already included in INCOG's membership are Pawnee and Okmulgee counties. As the primary convener of intergovernmental collaboration and transportation planning for our region, INCOG is uniquely qualified and positioned to accomplish the CPRG grant program deliverables.

INCOG's Office of Energy and Environmental Sustainability is leading the agency's development of CPRG deliverables in alignment with existing air quality programs managed and administered by the Office. These programs include the Tulsa Air Quality Program, the Ozone Alert! program, the Tulsa Area Clean Cities program. While significant progress has been made over the decades through the above-mentioned programs, the CPRG program presents an opportunity for a broader approach in addressing environmental sustainability challenges across the Tulsa region.

1.2 PCAP Overview and Scope

The Primary Climate Action Plan (PCAP) for the Tulsa region includes all of the requirements set forth by the EPA, including a greenhouse gas emissions inventory for the region, a benefits analysis for Low-Income and Disadvantage Communities (LIDAC), quantified greenhouse gas (GHG) emissions reduction measures, and a review of authority for implementation.

INCOG has worked in close coordination with the Oklahoma Department of Environmental Quality (ODEQ) and the Association of Central Oklahoma Governments (ACOG) to develop two key components of this PCAP: the GHG emissions inventory and quantified GHG reduction measures. ODEQ's GHG emissions inventory has been enhanced by providing more emissions data in the Tulsa MSA region, with a particular focus on transportation emissions. This was accomplished by using MOVES, AVERT, and AFLEET software.



Based on the results of the GHG inventory, reduction strategies were developed in conjunction with partner organizations. These strategies were shared with stakeholders and residents, particularly those in disadvantaged communities, in order to develop a prioritization matrix for implementation. Additionally, by using tools like the [Climate and Economic Justice Screening Tool \(CEJST\)](#), [EPA's EJ Screen](#), and the [Census Bureau's Areas of Persistent Poverty and Historically Disadvantaged Communities](#), these prioritized reduction strategies can be focused to address the impacts of the disproportionate effects of GHG pollution on low-income and other disadvantaged communities.

1.3 Approach to Developing the PCAP

As the Lead Organization for the development of the PCAP for the Tulsa MSA, INCOG first began by developing the Work Plan that describes the partnerships, processes, and deliverables for the different components of the CPRG program. After submitting the Work Plan to EPA, INCOG began the process to complete the PCAP. This process involved a great deal of community engagement, research, analysis, and strategizing to identify key greenhouse gas emissions reduction measures.

Community Survey

In coordination with the Oklahoma Department of Environmental Quality (ODEQ) and the University of Oklahoma, INCOG distributed and promoted a survey for LIDAC community members and stakeholder organizations in the Tulsa area to identify priority GHG emissions issues. The results of this survey showed that the highest priority initiatives for those surveyed include:

- Planting native trees (and other plants) and using shade structures to reduce the Urban Heat Island Effect
- Upgrades to wastewater facilities for better efficiency
- Low-cost upgrades to improve energy efficiency for residents
- Making public transit more accessible and affordable
- Making recycling and composting available
- Updating to more energy efficient building standards and codes

The results of this survey were consistent with what was heard through other engagement activities, indicating that the issues that face LIDAC communities do not differ greatly from the issues that concern all people in the Tulsa region with regard to the effects of unchecked greenhouse gas emissions. These findings were incorporated into the reduction measures later in this PCAP.

Engagement Activities

INCOG coordinated and hosted several local events to gather input from community members and stakeholder organizations between the months of November 2023 and February 2024.

INCOG hosted a cooperative public meeting with ODEQ on December 7th at Oklahoma State University's Tulsa campus to solicit feedback on potential projects for the CPRG program. Attendees included members of the general public, industry representatives, and government entities.

A CPRG Summit was held on January 18th at a community center in Tulsa, which included a presentation and panel discussion offering perspectives on developing and implementing strategies to reduce greenhouse gas emissions in Oklahoma. Panel members included Sarah Terry-Cobo with the City of Oklahoma City's Office of Sustainability, who discussed on the City's 2021 sustainability plan and the progress towards implementation; Montelle Clark with the Oklahoma Sustainability Network, who focused on the mechanisms of State government that enable or hinder progress towards greenhouse gas emissions; Ryan Baze from the City of Broken Arrow, who touched on the utilization of EPA grant funding to implement energy efficiency improvements to public facilities in Broken Arrow; and Noah Oaks from the South-Central Partnership for Energy Efficiency as a Resource (SPEER), who provided insights on energy efficiency code and stretch code. The meeting was well attended with elected officials and municipal department directors, engineers, and planners from numerous cities and counties in the region.

INCOG staff collaborated with the University of Oklahoma College of Architecture to host a series of public meetings with LIDAC neighborhoods in Tulsa and a town hall with the presentation and discussion in Spanish. INCOG partnered with ODEQ and University of Oklahoma faculty to host a series of Technical Assistance Forums with the public. Three meetings were held, each with a specific focus, including:

1. The affects of climate change on LIDAC populations and reduction measures that prioritize the outcomes of these populations
2. Community benefits
3. Reduction measures for the transportation sector

INCOG staff met weekly with EPA Region 6 members for CPRG coordination meetings, learning best approaches for the development of the PCAP, potential reduction measures, and building relationships with peers in cities across Region 6.

The CPRG program and the PCAP process were presented at the monthly INCOG Board of Directors meeting to spread knowledge of the program to leaders across the region. The INCOG Board of Directors comprises 56 members from 17 cities and towns, 5 counties, and 3 tribal nations (Cherokee Nation, Muscogee Nation, and Osage Nation). This presentation alerted member governments to the upcoming regional virtual meeting to field input and project ideas to complement the input from the preceding events and to ensure that more rural areas of the region had a fair opportunity to participate in the way that larger municipalities in the region had.

INCOG staff coordinated with statewide environmental advocacy organizations to field input and promote the public meetings. Public promotional posts and discussions were made on social media with leaders of these organizations.

INCOG staff also coordinated closely with the City of Tulsa's Mayor's Office of Resilience and Equity to ensure that the largest city in the region is well apprised of the process, progress towards the development of the PCAP, and what reduction measures are the highest priority of community members in Tulsa and the greater Tulsa region.

Research

INCOG staff spent significant time conducting research to inform the development of the PCAP. This included deep dives into specific reduction measures that have been planned and implemented in peer communities. The EPA's Quantified Emissions Reduction Directory also provided a wealth of examples that inspired further investigation into strategies that could prove effective in the Tulsa region.

Existing climate action plans, greenhouse gas emissions reduction strategies, and other sustainability planning documents served as resources for INCOG staff in the development of the PCAP. In particular, the City of Oklahoma City's sustainability plan, *adaptokc*, provided many strategies and actions that have already been vetted in an Oklahoma context, giving INCOG staff a realistic understanding of what can be accomplished in this state.

Regular discussions were held with the Oklahoma Sustainability Network for the similar purpose of understanding what work is ongoing, what efforts have been more challenging in Oklahoma, and what priorities have been identified previously for greenhouse gas emissions reductions in the state.

INCOG staff coordinated with the University of Oklahoma to reference the OU Climate Justice Study that was developed in 2024 in partnership with the Southern Climate Impacts Planning Program (SCIPP). This report included an evaluation of efforts made by governments in Tulsa to address climate impacts on vulnerable populations.

Using the EPA National Emissions Inventory and USDA County level Census data INCOG staff developed the greenhouse gas inventory for the Tulsa region to be included in the PCAP. The years 2017 and 2021 were used

to show trends, intentionally avoiding the years most affected by the COVID-19 pandemic and shut-down which altered normal transportation and industrial processes and clouded trends in greenhouse gas emissions.

Mapping and data analysis were conducted to ensure that priority reduction measures will be strategically implemented in geographic areas that are most affected by greenhouse gas emissions as well as populations that are most likely to be negatively affected by emissions.



Panel members share their success stories at the CPRG Summit held in Tulsa in January 2024.



ODEQ staff and University of Oklahoma students and staff engage with residents during a workshop.



Professor John Harris from the University of Oklahoma Christopher C. Gibbs College of Architecture speaks a workshop in the Phoenix District in Tulsa.

A promotional flier for a virtual public input session. The top half has a blue sky background with a yellow flower logo containing the letters 'C', 'P', 'R', 'G'. The text reads: "Regional Climate Action Plan Virtual Public Input Session Thursday, February 15, 2024 5:30 pm – 6:30 pm". Below this is a green section with white text: "This is a once-in-a-generation moment to reduce air pollution that negatively impacts our community's public health and has the potential to damage our regional economy. This is an opportunity to continue building the clean energy economy in a way that benefits all Oklahomans, provides new workforce opportunities, and addresses the historical environmental injustices in disadvantaged communities." It then says "A FREE virtual information and input session designed to let YOUR voice be heard!" followed by a bulleted list: "Hear about the Tulsa Metro Greenhouse Gases (GHG) inventory.", "Learn more about GHG reduction strategies.", and "Hear how your organization can apply for the the \$4.3 billion available in grants for implementation of reduction strategies and projects that reduce GHG emissions." At the bottom, it says "To participate in this meeting, go to: https://us06web.zoom.us/j/84049959685 or click the QR code:" and includes a QR code, the INCOG logo, and the Tulsa Air Quality logo.

This flier was distributed to rural communities to promote the virtual public input session in February 2024.

2. TULSA MSA CONTEXT

As the world responds to the impending consequences of climate change, whether through mitigation measures or outright avoidance, the decisions made over the next several years will have long-lasting effects on the future quality of life in the Tulsa metropolitan area. As a major extractor, transporter, and refiner of petroleum and petroleum products, Oklahoma stands to feel the changes needed to address climate change more greatly than some American states. Given this reality, it is critical that the transition to a more resilient and sustainable future is phased so as to replace existing economic structures and support the ongoing prosperity of Oklahomans.

The Tulsa Metropolitan Statistical Area (MSA) is the second largest MSA in Oklahoma after Oklahoma City, but Tulsa is also the largest city in any Indian tribal boundary in the United States. The entire MSA is within the tribal boundaries of five Tribal Nations. This overlapping jurisdiction has recently become contentious with the Supreme Court ruling in the *McGirt vs. Oklahoma* case related to the question of disestablishment of the Indian reservations; however, this overlap presents unique opportunities to collaborate.

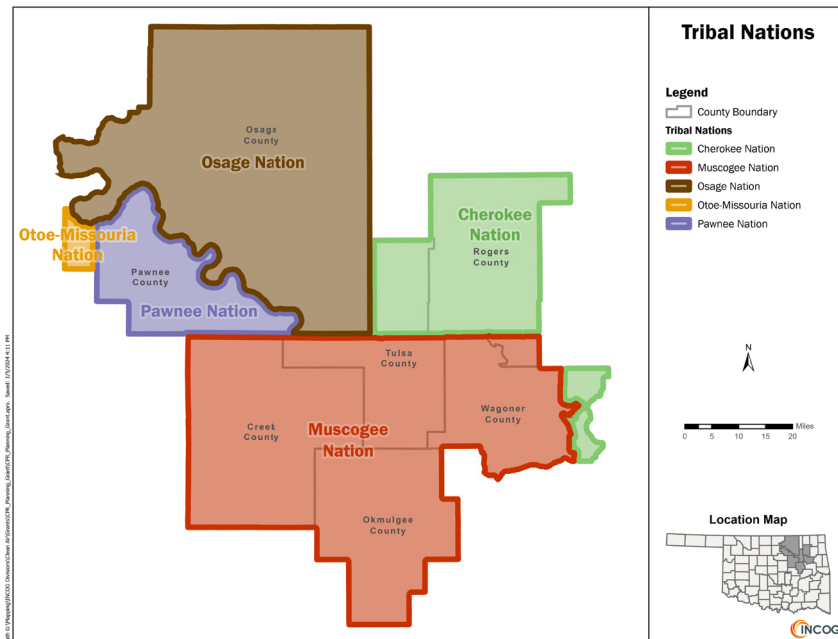
The Council on Environmental Quality (CEQ), at the direction of President Biden in Executive

Order 14008, developed the Climate and Economic Justice Screening Tool, and given the Tulsa MSA's location at the intersection of the Osage Nation, Cherokee Nation, and Muscogee Nation, the entire MSA is identified as "disadvantaged". While this tool highlights the significance of the Tulsa MSA in the Justice40 initiative, the composition of the region is varied, and the effects of climate change are felt differently across vulnerable population groups.

According to the EPA's EJ Screen tool, many areas in close proximity to the highways in the Tulsa region are above the 80th percentile, with significant areas above the 95th percentile, of particulate matter, ozone, and diesel particulate matter. Air pollutant exposure is particularly significant in areas of the region that have lower levels of tree canopy coverage and higher risks of extreme heat and other weather events.

Extraction and refinement of oil and natural gas have also had a lasting impact on vulnerable population groups in the region with some Brownfield and Superfund sites associated with soil contamination occupying sites within areas that are historically Black and Indigenous.

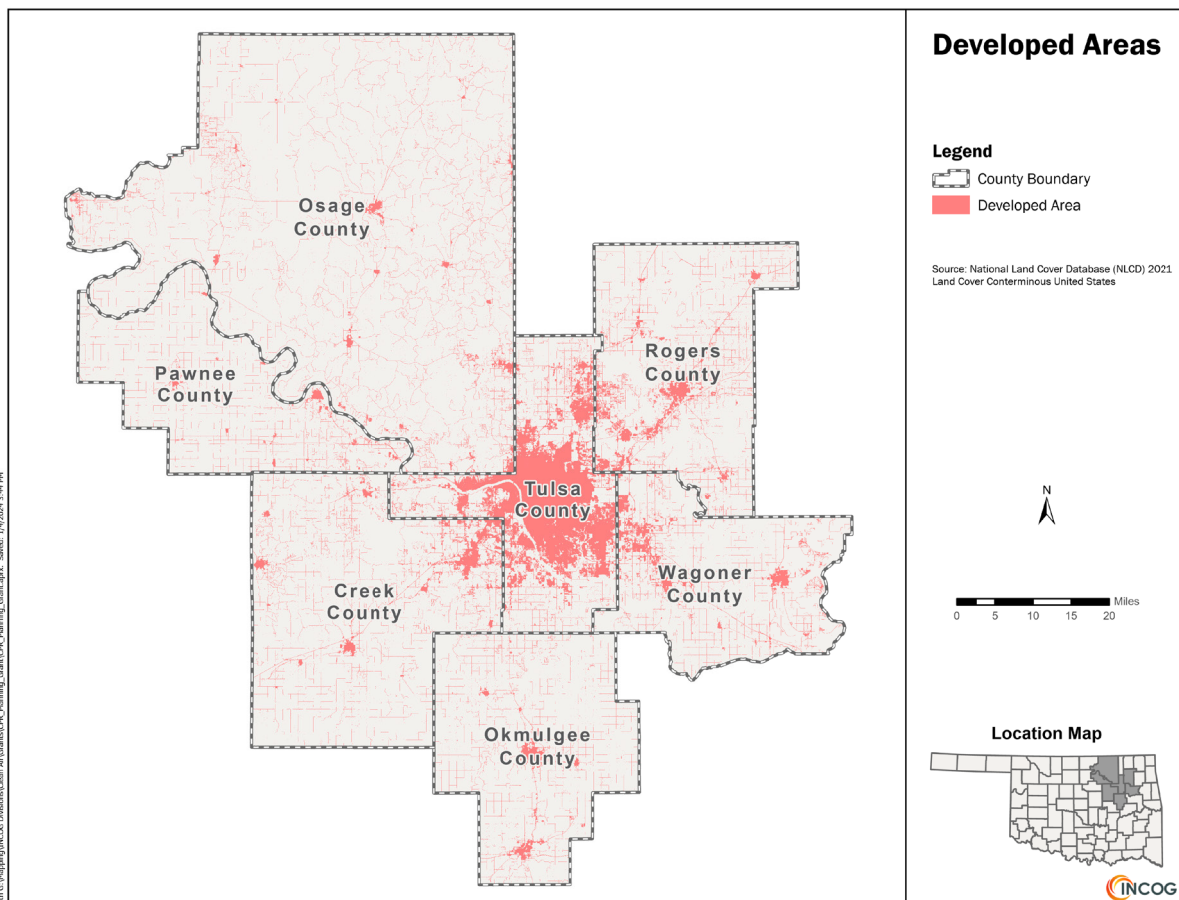
Vulnerable populations in the region are not limited to the urban areas, and much of the impact of climate change will be felt by residents in rural areas, especially in lesser-developed areas of the tribal reservations. Extreme heat and storms are projected to increase, and areas of the region with less access to emergency services, as well as those who rely on the production value of the land, will be vulnerable to these climatic changes and weather events. While the region is accustomed to severe weather as a reality of living in Tornado Alley, an increase in these events presents a threat to property, livelihood, and life. Most rural areas have seen population declines in recent decades, and additional pressures from the environment could exacerbate this population loss and increase barriers to moving for those that are most disadvantaged.



In the Tulsa MSA, Osage County has the greatest amount of rural area, and the County boundaries align with the reservation boundaries of the Osage Nation. The Osage Nation has historically benefited from the extraction of oil on their reservation. Osage County is the largest county in Oklahoma, and is larger than the state of Rhode Island. The county is very rural, with a population density of 20 people per square mile.

The Tulsa region has been a leader in energy innovations for over a century, and as the world transitions to renewable and lower-carbon forms of energy, the region is poised to leverage its abundant natural resources and energy sector expertise to continue prospering as an energy leader in the next century. Tulsa’s unique geography provides very high potential for solar and wind energy, with Oklahoma producing more wind energy than any state besides Texas and ample opportunity for expanding wind resources, in addition to having the sixth highest solar potential of any state. Oklahoma’s major state universities also play a critical role geothermal energy technology development, bolstered by the applicability of the state’s extensive oil and gas industry talent.

Tulsa is unique in the amount of significant contributions from the philanthropic sector. Investments such as the award-winning park, Gathering Place, and the geothermally powered Guthrie Green are excellent examples of how Tulsa’s philanthropic community values a greater degree of environmental sustainability. The State of Oklahoma, The City of Tulsa, and other government organizations have demonstrated an openness to innovation in the energy and transportation sectors, incentivizing and attracting numerous businesses whose products include solar cells, electric vehicles, lithium, and wind energy. This confluence of investment in clean energy innovation demonstrates the region’s unique assets that may be leveraged in implementing the Climate Pollution Reduction Grant program. The Tulsa region should serve as a key representation of the EPA’s ambitions and commitments, and funding for intervention will go further in this region than most across the country.



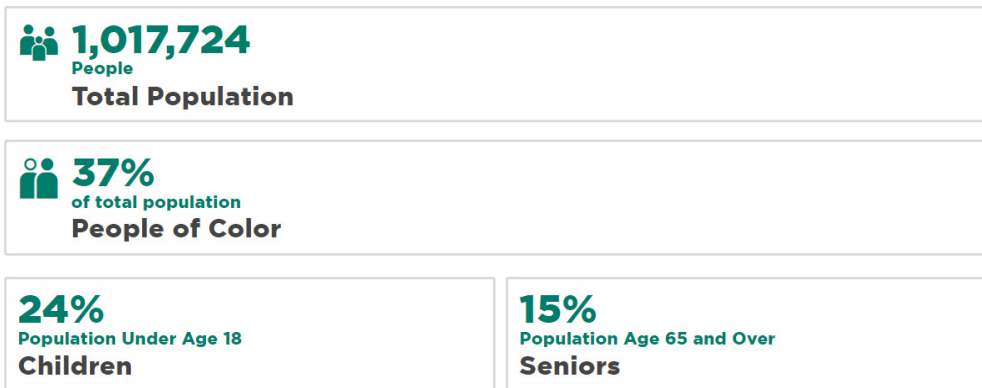
Demographic Profile

Located in the northeast region of the state of Oklahoma, known as Green Country, Tulsa's Metropolitan Statistical Area consists of seven counties: Tulsa, Creek, Okmulgee, Osage, Pawnee, Rogers, and Wagoner counties, as well as five tribal nation reservations that overlap within the MSA.

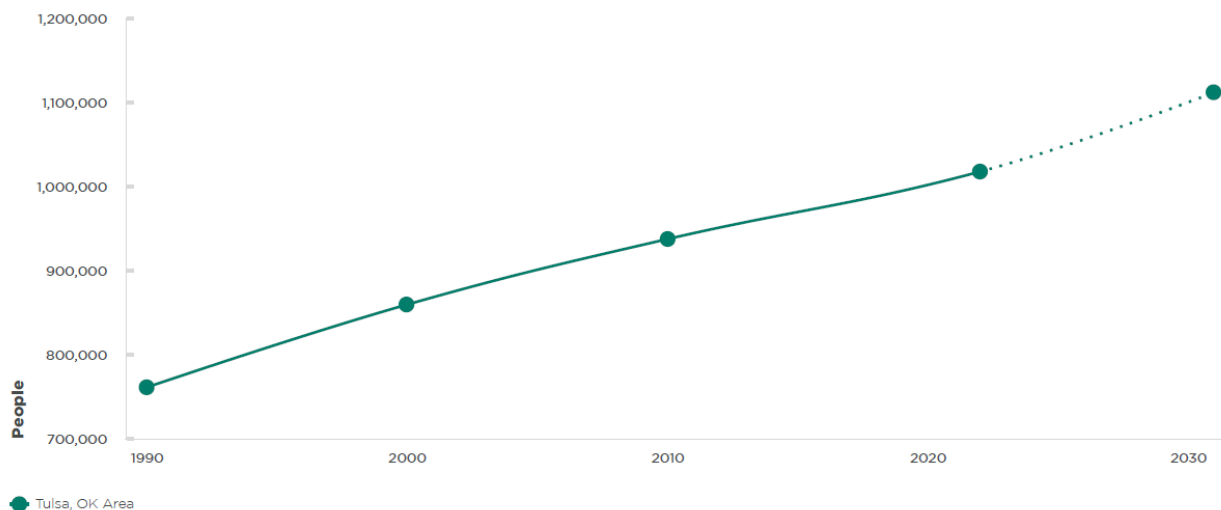
According to the most recent American Community Survey (ACS), the Tulsa MSA has a total population of 1,017,724 people making it the second largest MSA in Oklahoma after Oklahoma City. Tulsa County accounts for 65.7% of the MSA population, with 668,923 people. The remaining 6 counties make up the remainder of 34.3% of the total MSA population, with a 348,801 people.

The poverty rate for the Tulsa MSA is 13.5%, though there is variation among the 7 counties. On the high end, Okmulgee County has a poverty rate of 18.0%, and on the low end, Wagoner County has a poverty rate of 9.2%.

By race and ethnicity, the Tulsa MSA is as follows: 62.9% White (non-Hispanic), 10.8% Hispanic, 7.8% Black (non-Hispanic), 6.9% American Indian (non-Hispanic), 2.8% Asian (non-Hispanic), 8.5% Two or More Races (non-Hispanic), and 0.4% Single Other Race (non-Hispanic). Again, there is substantial variation among the 7 counties with regard to the distribution of minority racial and ethnic groups. For example, Creek County, Okmulgee County, Osage County, and Rogers County all have greater than 10% American Indian (non-Hispanic) population, while Tulsa County has 13.7% Hispanic population. The region has a higher rate of Two or More Races (non-Hispanic) than other areas of the country due in part to tribal nation citizenship.



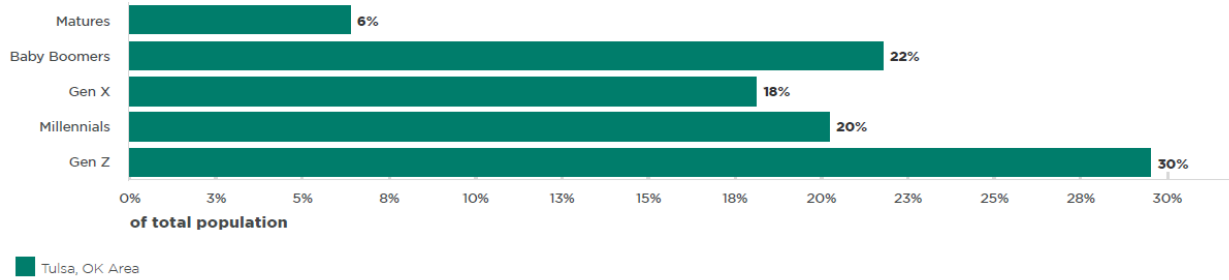
Total Population



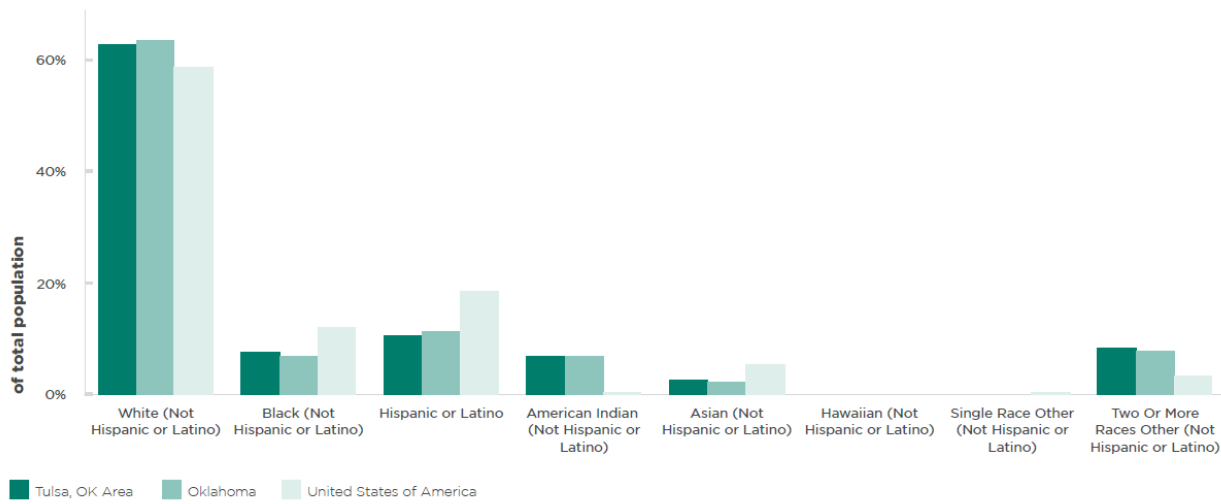
Sources: US Census Bureau; US Census Bureau ACS 5-year

Population projections from mySidewalk: Projections use a modified linear regression over the years: 1990, 2000, 2010, and ACS 2018-2022 (midpoint of 2020 was used). The slope of the regressor is standard, and the ACS 2018-2022 value is always used as the offset instead of the standard regression offset, as it is the last known good of the series.

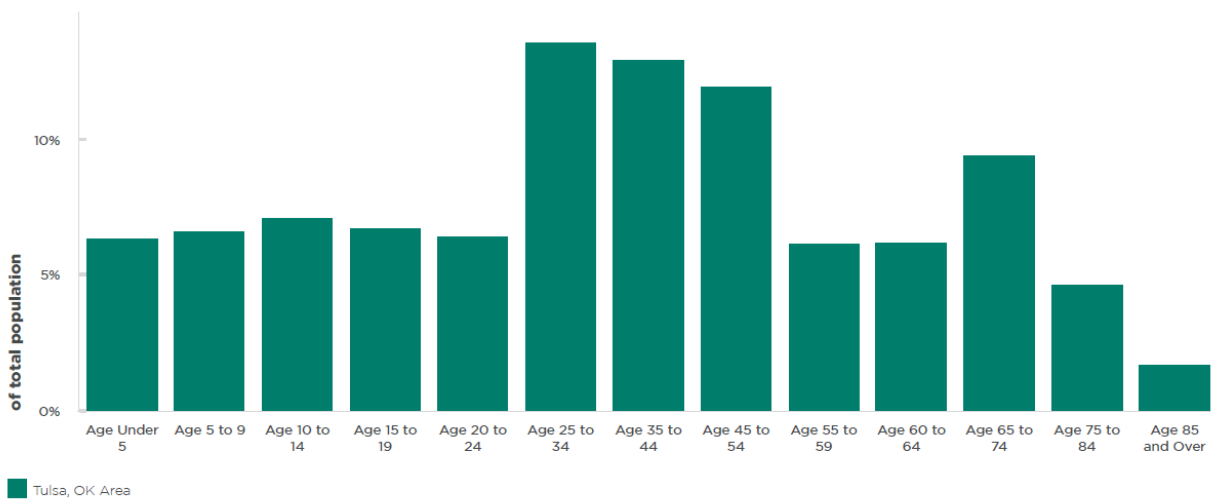
Generations



Race/Ethnicity Totals



Age Totals



Sources: US Census Bureau ACS 5-year 2018-2022

3. GHG REDUCTION PRIORITY MEASURES

3.1 Greenhouse Gas Emissions Inventory

Greenhouse gas (GHG) are gases that contribute to the “greenhouse” effect by absorbing infrared radiation, which in turn warms our planet. Major contributors of these gases are Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), and various fluorinated gases such as hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride.

This Greenhouse Gas Emissions Inventory is broken down by sectors:

1. Transportation
 - a. Mobile On Road
 - b. Mobile Non-Road
2. Waste Management
 - a. Solid Waste Diversion
 - b. Methane Capture
3. Government Buildings
 - a. Electric Power
 - b. Resilience Hubs
4. Commercial and Residential Buildings
 - a. Electric Power
5. Natural Lands
 - a. Tree Canopy Sequestration
 - b. Riparian Corridor Rehabilitation

Data Sources and Methodology

Tulsa MSA’s GHG Inventory was compiled using various reputable public data sources as recommended by Environmental Protection Agency (EPA). Data sources and tools such as the following were used:

- EPA’s National Emissions Inventory (NEI)
- EPA MOVES4 (Motor Vehicle Emission Simulator)
- EPA FLIGHT (Facility Level Information on GreenHouse gases Tool)
- United States Census
- In-house Indian Nations Council of Governments,
- United States Department of Agriculture (USDA),
- United States Department of Transportation Federal Highway Administration (USDOT)
- Google Earth Engine (for satellite and mapping purposes)

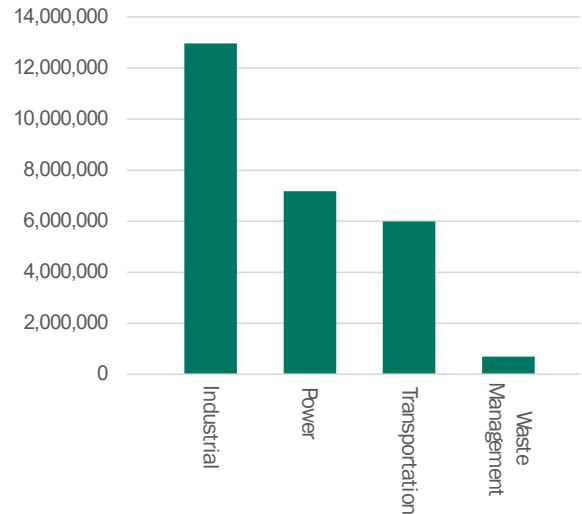
The year 2017 was selected as the baseline for inventory collection. This was an ideal year for collecting demographic, census, and emission data because it reflects a standard year. Data before 2020 gives a better outlook as to what standard emissions looked like before being interrupted by a global pandemic that shifted emission outputs throughout various sectors, especially transportation, significantly.

Total Emissions in the Tulsa MSA

Total emissions were determined by both sector and counties within the Tulsa MSA. In the table and chart by sector, all emissions data other than Transportation came from the National Emissions Inventory (NEI) from the EPA. Transportation emissions data came from the Motor Vehicle Emission Simulator (MOVES). The NEI was the only source used for County level data, which accounts for the discrepancy between the total emissions in the Sector and County tables.

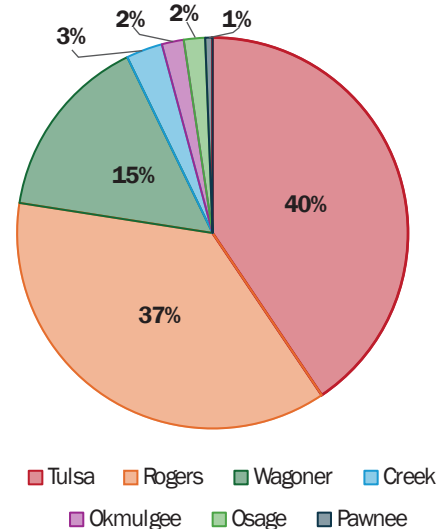
Total CO2e by Priority Sector

Priority Sector	Emissions (metric tons of CO2e)
Industrial	12,972,014
Power	7,173,304
Transportation	5,991,260
Waste Management	695,662
TOTAL	26,832,240



County	Emissions (metric tons of CO2e)
Tulsa County	11,176,686
Rogers County	10,164,794
Wagoner County	4,229,400
Creek County	828,850
Okmulgee County	500,307
Osage County	484,615
Pawnee County	166,990
TOTAL	27,551,642

% of Total CO2e by County



Transportation

Mobile On Road

Baseline (in metric tons CO ₂ e)
2017 (annual)
5,991,260

Quantified Emissions Reduction (in metric tons CO ₂ e)	
2025 - 2030 (cumulative)	2025 - 2050 (cumulative)
974,855	4,102,119

Using the EPA's National Emissions Inventory and the MOVES (MOTOR VEHICLE Simulator) model, it was identified that in the year 2017, the Tulsa MSA outputted 5,991,260 metric tons of CO₂e of On-Road mobile emissions.

To estimate the reduction in greenhouse gas emissions for electric vehicle adoption the analytical process was as follows. The INCOG Transportation division produced a daily Vehicle-Miles Traveled (VMT) value for the Tulsa Transportation Management Area (TMA) using Q (note: VMT data is not available for the entire MSA, only for the smaller TMA). This was extrapolated out to 2050. For each year, it is assumed that there will be a 0.34% adoption rate, and by 2050 9.52% of vehicles traveling in the region would be EVs (note: this is a conservative estimate based on adoption rates thusfar in the region). For each year, total EV percentage was multiplied by the annual VMT to get total miles driven by EVs and multiplied by the average CO₂ emission per mile for an ICE vehicle. This was then converted to metric tons of CO₂.

Mobile Non-Road

Baseline (in metric tons CO ₂ e)
2017 (annual)
278,187

Quantified Emissions Reduction (in metric tons CO ₂ e)	
2025 - 2030 (cumulative)	2025 - 2050 (cumulative)
97,365	Not available

The GHG emissions from 2 and 4-cycle lawn equipment using the EPA 2017 NEI data for Transportation Non-Road Gasoline Powered Equipment are estimated to be 278,187 Mt of CO₂e in our baseline year of 2017. Reduction estimates from this strategy were calculated using information from Research and Markets, an international market research and analysis firm, and Power Systems Research, a leading global production and market forecasting firm. According to Research and Markets 2019 report "U.S. Electric Lawn Mower Market – Comprehensive Study and Strategic Analysis 2019-2024", there is anticipated Compound Annual Growth Rate (CAGR) of electric lawn mower adoption in the U.S. of 5% from 2018-2024. Additionally, according to Power Systems Research the current handheld lawn equipment market will see a CAGR of 12% from 2021 to 2023. Utilizing these rates of adoption to inform our understanding of the potential adoption rate in our region and subsequent emission reductions, we opted for a conservative assumption that a 7% adoption rate will be realized through 2030 with an incentive program like the "E"bate strategy for reducing associated GHG emissions, resulting in a projected reduction of GHG emissions of 97,365 Mt CO₂e in the 2030.

Waste Management

Solid Waste Diversion

Baseline (in metric tons CO ₂ e)
2017 (annual)
695,662

Quantified Emissions Reduction (in metric tons CO ₂ e)	
2025 - 2030 (cumulative)	2025 - 2050 (cumulative)
486,963	1,391,320

The total GHG emissions in 2017 from the waste management sector in the Tulsa MSA, which includes two landfills and a waste combustion facility, were 695,662 Mt of CO₂e. According to the EPA’s “Advancing Sustainable Materials Management: 2018 Fact Sheet”, compostable organic materials comprise 51.4% of the solid waste in landfills. In this scenario we are going to assume that all of the GHG emissions from the waste management sector sources are the result of disposed organic material. Therefore, diverting organic material from landfills would more than likely observe a reduction of direct GHG emissions from the waste management sector. If a 10% diversion rate could be realized through local or regional composting programs, we can conservatively estimate the emission reductions will correspond proportionally with the amount of waste diverted. 2030 - 486,963 Mt CO₂e, 2050 - 1,391,320 Mt CO₂e.

Methane Capture

Baseline (in metric tons CO ₂ e)
2017 (annual)
366,000

Quantified Emissions Reduction (in metric tons CO ₂ e)	
2028 - 2030 (cumulative)	2028 - 2050 (cumulative)
494,100	3,623,400

Using the EPA’s Facility Level Information on Greenhouse Gases Tool (FLIGHT) biogas from landfills in the Tulsa MSA were evaluated. Based on the emissions data using the FLIGHT tool, the average landfill in the Tulsa area emits 183,000 metric tons of CO₂e. Assuming a 90% biogas capture efficiency, this results in a diversion of 164,700 metric tons of CO₂e annually. This project assumes a methane capture facility at one landfill to be in operation by 2028; therefore, the diversion amount can be multiplied by the number of years the diversion process is in service to determine cumulative reductions for 2030 and 2050.

Government Buildings

Electric Power

Baseline (in metric tons CO ₂ e)
2017 (annual)
7,173,304*

Quantified Emissions Reduction (in metric tons CO ₂ e)	
2025 - 2030 (cumulative)	2025 - 2050 (cumulative)
4,488	11,220

INCOG has operated an Energy Revolving Loan Fund for local governments since 2016 which has provided capital to local governments within the Tulsa MSA for the purpose of energy efficiency upgrades to their facilities. The improvements have included new HVAC systems, a boiler, and installation of energy efficient lighting. Utility data is collected from the recipients to monitor each project's energy and cost savings. According to the data from the three different facilities that received retrofits, on average the facilities observe approximately 187 Mt of CO₂e annual reductions when compared to the baseline utility data before the upgrades occurred. 2030 - 4,488 Mt of CO₂e, 2050 - 11,220 Mt of CO₂e.

Resilience Hubs

Baseline (in metric tons CO ₂ e)
2017 (annual)
7,173,304*

Quantified Emissions Reduction (in metric tons CO ₂ e)	
2025 - 2030 (cumulative)	2025 - 2050 (cumulative)
6,620	33,020

Several existing community/activity centers have been identified as desirable locations for the establishment of hardened neighborhood facilities to support residents in times of need before, during, and after hazardous weather events or disruptions in utility services. These facilities will be retrofitted with renewable energy equipment and batteries to allow for constant operational readiness when their services are needed most. Our scenario for emission reduction estimates assumes the stated upgrades are completed on all five centers and we have based our reductions on the emissions calculated using the 2023 electricity and gas purchased for each facility. The EPA's Simplified GHG Emissions Calculator was used to calculate the annual emissions for each facility and then averaged across all five facilities. According to the calculator, in 2023 the total CO₂e emissions for all five centers was 1,324, which is an average of 264 Mt CO₂e each. Assuming all five facilities are upgraded with solar arrays, batteries, and new energy efficient HVAC equipment and lighting, the total projected emission reductions from operations is approximately 6,620 Mt CO₂e in 2030 and 33,020 Mt CO₂e.

*This value is the total CO₂e emissions for electric power use from buildings in the MSA, and is used as the baseline in both the Government Buildings and Commercial and Residential Buildings sections of this plan.

Commercial and Residential Buildings

Electric Power

Baseline (in metric tons CO ₂ e)
2017 (baseline)
7,173,304*

Quantified Emissions Reduction (in metric tons CO ₂ e)	
2025 - 2030 (cumulative)	2025 - 2050 (cumulative)
199,034	392,170

The total GHG emissions in 2017 from the power sector in the Tulsa MSA were 7,173,304 according to the EPA 2017 NEI. The World Resources Institute Climate Watch determined that 17.5 % of electric generation is utilized by commercial and residential structures. Therefore, the total annual emissions attributable to commercial and residential structures in the Tulsa MSA is approximately 1,255,328 Mt of CO₂e. The Institute for Market Transformation, a Washington D.C. based nonprofit focused on increasing energy efficiency in buildings by bridging the gaps between government, business, and the community. According to their “Building Energy Code Savings Calculator”, which the selected input of utilizing the 2018 International Energy Conservation Code (IECC) and a 75% code compliance rate determined that the projected 2030 GHG emission reductions for the Tulsa metro were approximately 199,034 Mt of CO₂e and the 2050 projection was 392,170 Mt of CO₂e.

*This value is the total CO₂e emissions for electric power use from buildings in the MSA, and is used as the baseline in both the Government Buildings and Commercial and Residential Buildings sections of this plan.

Natural Lands

Tree Canopy Sequestration

Baseline (in metric tons CO ₂ e)
2017 (annual)
(1,053,321)

Quantified Emissions Reduction (in metric tons CO ₂ e)	
2025 - 2030 (cumulative)	2025 - 2050 (cumulative)
N/A*	(13,500)

*Immature trees are a negligible carbon sink.

Using the Land Use and Forestry Module Tool provided by the EPA, the net sequestration of Tulsa MSA, with its baseline year of 2017, is 1,029,224 metric tons of CO₂e sequestered. The Tulsa Urban Forest Master Plan (2016) commissioned by local non-profit, Up With Trees, sets a goal of increasing the total tree canopy coverage in Tulsa County from 26% to 30% over 20 years. To meet that goal, the plan states 15,000 trees need to be planted each year for 20 years. Starting in 2025, if an additional 15,000 trees were planted throughout Tulsa MSA: According to deciduous tree maturity rates of 10 years, 36.4 lbs C/tree × (44 units CO₂/12 units C) × 1 metric ton/2,204.6 lbs = 0.060 metric ton CO₂ per urban tree planted. Then when those trees reach maturity in 2035, an additional 900 metric tons of CO₂ will be sequestered. Projecting out 15 years to 2050 gives a sequestration total of 13,500 metric tons of CO₂.

Riparian Corridor Rehabilitation

Baseline (in metric tons CO ₂ e)
2017 (annual)
(31,022,604)






Quantified Emissions Reduction (in metric tons CO ₂ e)	
2025 - 2030 (cumulative)	2025 - 2050 (cumulative)
N/A*	(1,189,947)

*Immature trees are a negligible carbon sink.

According the Watershed Index Online (WSIO) tool, in the Tulsa MSA the total area of riparian zones that is considered developed, and therefore able to be rehabilitated, is 21,061 hectares. The total area of riparian zones that is considered undeveloped is 477,271 hectares. Riparian areas hold on average 68 to 158 metric tons of carbon per hectare in biomass at maturity. Assuming existing undeveloped riparian zones hold the 68 metric tons per hectare results in the current baseline of 31,022,604 metric tons of carbon. Using the an average of the holding capacity of riparian zones at 113 metric tons per hectare for rehabilitated sections, and planning for 50% of developed sections of riparian zones to be rehabilitated, results in an additional 1,189,947 metric tons of carbon sequestration by 2050.

3.2 Quantified Greenhouse Gas Reduction Measures

These measures were identified based on the community and stakeholder engagement, research, and technical analysis.

Reduction Sector	Description
TRANSPORTATION 	Local governments have substantial control over the funding and construction of infrastructure, as well as the ownership and maintenance of public fleet vehicles. This positions transportation as a sector that local governments can prioritize for greenhouse gas emissions reduction measures. Alternative fuels for fleets, active transportation options, and expanded charging infrastructure are examples of approaches considered in this PCAP.
WASTE MANAGEMENT 	Waste management processes are largely conducted by or funded by local governments. This level of influence can facilitate measures to reduce greenhouse gas emissions associated with current processes. Expanded waste diversion opportunities for residents and businesses such as recycling and composting, as well as methods to capture emissions from waste processing facilities are viable options to reduce greenhouse gas emissions in the Tulsa area.
GOVERNMENT FACILITIES 	Local governments often own many facilities, whether a City or Town Hall building, fire and police stations, transit stations, or other administrative buildings. The local government control of these facilities presents opportunities for investments to enhance energy efficiency. Public facilities can also be utilized to address hazardous outcomes for residents, particularly those in LIDAC communities who would benefit from concentrated hubs to enhance climate resilience.
COMMERCIAL AND RESIDENTIAL FACILITIES 	For buildings owned by private owners, different approaches can be taken by local governments to reduce greenhouse gas emissions associated with the operations of these structures. Incentives and rebates can prompt improved energy efficiency, extreme weather resilience, and strategies to reduce urban heat island effects. Additionally, local governments use building codes to regulate safety and efficiency, and new energy codes, or “stretch codes”, can be adopted to regulate greenhouse gas emissions.
NATURAL LANDS 	Vegetation naturally removes carbon dioxide from the air through photosynthesis, and this process will play a significant role in the reduction of greenhouse gas emissions. The Tulsa region includes a great deal of forest and grassland; however, urban areas have less tree canopy coverage and a lower percentage of native vegetation, exacerbating the urban heat island effect. Local governments can work with neighborhoods to enhance tree canopy coverage and to increase vegetation. Additionally, promoting green infrastructure and restoring riparian areas can sequester carbon, help mitigate increased heat and flooding events, and protect biodiversity by acting as wildlife corridors.



TRANSPORTATION

#1 Electric Vehicle Charging Network Expansion

PURPOSE	Reduce the number of internal combustion engine vehicle miles traveled (VMT) on Tulsa MSA roads. Make publicly-accessible EV charging stations available to residents least likely to have access to personal charging options.
DESCRIPTION	This project will expand the number and service area of electric vehicle charging stations across the Tulsa MSA adjacent to multi-family and student housing, along transportation corridors, and in proximity to employment centers.
LIDAC BENEFITS	Reduced air pollution (ozone, particulate matter, etc.) and associated health impacts
GHG EMISSIONS REDUCTION ESTIMATE	Approximately 974,855 metric tons of CO ₂ e reduced by 2030, and 4,102,119 metric tons of CO ₂ e by 2050
GEOGRAPHIC LOCATION	Tulsa MSA
IMPLEMENTING AUTHORITY	Tribal governments, State of Oklahoma, INCOG, local governments (cities, towns, and counties)
POTENTIAL FUNDING SOURCES	U.S. Department of Energy, Federal Highway Administration

IMPLEMENTATION COMPONENTS

- 1. Expand Level 2 charging infrastructure.***
 - a. Identify suitable land uses for coordination with ownership for installation, including multi-family properties, student housing, and employers.
- 2. Improve EV charging access.**
 - a. Identify gaps in the network of EV charging stations in proximity to highways.
 - b. Install DC fast charging stations.
- 3. Develop commercial cooperative charging hubs.**
 - a. Build a coalition of private companies for participation.
 - b. Identify a suitable site for design and implementation of the hub.

*Oklahoma is unique in that there are more Level 1 fast-charging stations than Level 2 stations.



TRANSPORTATION

#2 Financial Incentives for EV Purchases

PURPOSE	Reduce the number of internal combustion engine vehicle miles traveled (VMT) on Tulsa MSA roads. Make EV ownership more affordable and accessible to LIDAC residents.
DESCRIPTION	Provide a financial incentive or rebate for the purchase of electric vehicles (including e-bikes, scooters, lawn equipment etc.) that considers the equitable distribution of funding.
LIDAC BENEFITS	Increased opportunity to transition to electric vehicles due to reduced costs for purchase and operations, reduced air pollution (ozone, particulate matter, etc.) and associated health impacts
GHG EMISSIONS REDUCTION ESTIMATE	On-Road: Approximately 974,855 metric tons of CO ₂ e reduced by 2030, and 4,102,199 metric tons of CO ₂ e by 2050 Non-Road: 97,365 metric tons of CO ₂ e reduced by 2030
GEOGRAPHIC LOCATION	Tulsa MSA
IMPLEMENTING AUTHORITY	Tribal governments, State of Oklahoma, local governments (municipalities and counties)
POTENTIAL FUNDING SOURCES	State and local tax revenue, in-kind administrative services

IMPLEMENTATION COMPONENTS

1. **Provide an “E-rebate” for all types of electric vehicles.**
 - a. This rebate can be used for plug-in or hybrid vehicles, e-bikes, scooters, lawnmowers and other lawn equipment.
 - b. Develop criteria to focus the rebates to LIDAC residents.
 - c. Develop a process for the exchange of non-EV vehicles for financial support in the purchase of an EV.



TRANSPORTATION

#3 Public Transportation Expansion, Enhancement, and Optimization

PURPOSE	Reduce the number of internal combustion engine vehicle miles traveled (VMT) by transportation service providers on Tulsa MSA roads. Increase mobility for residents that do not have access to an automobile.
DESCRIPTION	Fund studies and implementation projects to expand the service area of existing public transportation systems and services, add new EV and hybrid fleet vehicles, and study modifications to existing system alignments to optimize transit routes. Expand access to bike and car share services.
LIDAC BENEFITS	Increased mobility, better access to jobs and daily needs, reduced reliance on automobiles, reduced transportation costs, reduced air pollution (ozone, particulate matter, etc.) and associated health impacts
GHG EMISSIONS REDUCTION ESTIMATE	Approximately 5,412 metric tons of CO ₂ e by 2030, and 55,404 metric tons of CO ₂ e by 2050
GEOGRAPHIC LOCATION	Tulsa MSA
IMPLEMENTING AUTHORITY	Tribal governments, State of Oklahoma, INCOG, local governments (municipalities and counties), MTTA (Tulsa Transit), This Machine Bike Share
POTENTIAL FUNDING SOURCES	Federal Transit Administration, State and local tax revenue, in-kind administrative services

IMPLEMENTATION COMPONENTS

- 1. Expand transit and micromobility services in urban and rural areas.**
 - a. Conduct studies to evaluate the locations of greatest need for transit services that are presently unserved or underserved.
 - b. Purchase new vehicles and provide operations resources to service identified priority areas.
- 2. Convert existing rolling stock to EV or hybrid vehicles.**
 - a. Work with transit agencies to identify what rolling stock should be replaced and coordinate the purchase of EV or hybrid vehicles.
 - b. Implement MTTA's Zero-Emission Transition Plan.

#3 Public Transportation Expansion, Enhancement, and Optimization (continued)

- 3. Optimize existing transit systems.**
 - a. Conduct studies of existing transit system routes to determine efficiencies that can be gained to reduce wait times and the distances traveled along a given route.
- 4. Develop an EV and micromobility sharing programs.**
 - a. Provide resources to transportation service providers to establish bike and car share service.



WASTE MANAGEMENT

#1 Enhanced Waste Diversion Programs

PURPOSE	To reduce the amount of waste that contributes to the formation of methane.
DESCRIPTION	This project would expand waste diversion practices in the Tulsa MSA by funding curbside composting programs, establishing composting drop-off hubs in the Tulsa area to divert food waste from landfills, and expanding existing recycling services to new customers.
LIDAC BENEFITS	Increased opportunity to divert waste, increased opportunity for local and community gardening by use of community compost
GHG EMISSIONS REDUCTION ESTIMATE	Approximately 486,963 metric tons of CO ₂ e by 2030, and 1,391,320 metric tons of CO ₂ e by 2050
GEOGRAPHIC LOCATION	Tulsa MSA
IMPLEMENTING AUTHORITY	Tribal governments, local governments (municipalities and counties), The M.e.t.
POTENTIAL FUNDING SOURCES	Local tax revenue, service fees

IMPLEMENTATION COMPONENTS

- 1. Create composting waste diversion programs.**
 - a. Work with The M.e.t. to incorporate composting drop-off locations at existing recycling drop-off sites.
 - b. Develop a pilot project aimed at determining participation and program costs for a curbside composting program.
- 2. Expand existing recycling programs.**
 - a. Conduct a feasibility study to evaluate ways to expand existing recycling programs to new communities through The M.e.t. or other local service providers.
 - b. Provide supplemental funding for service expansion in the communities of highest priority identified in the feasibility study.



WASTE MANAGEMENT

#2 Methane Capture/ Renewable Natural Gas Production

PURPOSE	To reduce methane emissions from municipal landfill and wastewater facilities and offset fossil natural gas use in municipal operations.
DESCRIPTION	This project would fund improvements to landfill and wastewater treatment facilities to allow for the capture of methane and equipment to process that methane into pipeline-grade renewable natural gas for use in municipal buildings or fleets.
LIDAC BENEFITS	Taxpayer dollars saved through renewable natural gas production allows for increased spending on public services; improved air quality.
GHG EMISSIONS REDUCTION ESTIMATE	Approximately 494,100 metric tons of CO ₂ e by 2030, and 3,623,400 metric tons of CO ₂ e by 2050
GEOGRAPHIC LOCATION	Tulsa MSA
IMPLEMENTING AUTHORITY	Tribal governments, Local governments (municipal solid waste and wastewater departments), the M.e.t., landfill companies.
POTENTIAL FUNDING SOURCES	Public/private partnerships, local tax revenue, service and user fees

IMPLEMENTATION COMPONENTS

- 1. Conduct an audit of wastewater and landfill facilities in the Tulsa MSA to select the facility with greatest biogas capture potential.**
 - a. Conduct outreach to wastewater and landfill facilities to gather facility data and compare facilities based on state of repair, current GHG emissions, potential efficiency of biogas capture, and logistic ease of gas use in municipal operations.
- 2. Execute a contract between the municipal entity and selected facility owner (if different) and issue a request for proposals for a contractor to complete the project.**
 - a. Ensure contract outlines the municipalities expectations and terms for the RNG production and end-use.



GOVERNMENT FACILITIES

#1 Expand the INCOG Energy Efficiency Revolving Loan Fund

PURPOSE	To reduce building energy consumption and fund renewable energy retrofits for local government and non-profit entities.
DESCRIPTION	This project would provide funding to supplement and expand INCOG's existing energy revolving loan fund.
LIDAC BENEFITS	Frees public dollars for programs that can support LIDAC
GHG EMISSIONS REDUCTION ESTIMATE	Approximately 4,488 metric tons of CO ₂ e by 2030, and 11,220 metric tons of CO ₂ e by 2050
GEOGRAPHIC LOCATION	Tulsa MSA
IMPLEMENTING AUTHORITY	INCOG
POTENTIAL FUNDING SOURCES	State of Oklahoma State Energy Program

IMPLEMENTATION COMPONENTS

- 1. Establish internal accounting controls to avoid commingling of funds from different sources that have different reporting requirements.**
 - a. Work with Bank of Oklahoma Financial to create a new loan management system for each funding source.



GOVERNMENT FACILITIES

#2 Resilience Hubs

PURPOSE	To create neighborhood facilities augmented to support residents and coordinate resource distribution and services before, during, or after a hazard or disruption, including those due to changing climate conditions or hazard events.
DESCRIPTION	This project would lead to the development of sites in LIDAC neighborhoods that can serve as hubs for resilience against extreme weather, other natural disasters, and emergencies. These facilities will be designed to continue operations through these events, and to provide needed resources to community members less able to withstand such events. These hubs are places to educate and train community members to take action at the neighborhood scale to reduce greenhouse gas emissions by implementing PCAP strategies.
LIDAC BENEFITS	Households will be empowered to survive emergencies and environmental shocks and stressors; households will have safe place to access to basic needs, and everyday resilience-building activities; help households to be empowered to advocate for resources they need; help individual increase connection to their neighbors.
GHG EMISSIONS REDUCTION ESTIMATE	Approximately 6,620 metric tons of CO ₂ e by 2030, and 33,020 metric tons of CO ₂ e by 2050
GEOGRAPHIC LOCATION	Tulsa MSA
IMPLEMENTING AUTHORITY	Tribal governments, INCOG, and local governments (municipalities and counties)
POTENTIAL FUNDING SOURCES	EPA Community Change grant, local general funds, general obligation bonds, sales tax initiatives, private funds (foundations, businesses)

IMPLEMENTATION COMPONENTS

- 1. Implement a comprehensive community engagement and learning strategy to build knowledge about Resilience Hubs and the roles they play before (steady-state), during (emergency response), and after (recovery) a hazard or community shock.**
 - a. Community education, training, leadership development, workshops, resource referrals are all examples of what a Resilience Hub offers before a hazard or shock.
 - b. Increase social cohesion and advance equitable distribution of services and resources.
 - c. These efforts will be intentional about increasing social cohesion and recruiting a more diverse neighborhood volunteer base and thereby increasing public safety.

#2 Resilience Hubs (continued)

- 2. Either enhance existing community facilities or construct new facilities for the hub location.**
 - a. Assess existing community structures in the area and work with the ownership to evaluate needed upgrades to ensure resilience functions and reduction of GHG emissions.
 - b. In lieu of existing structures, identify sites for a new facility, identify a design operation, and construct a facility to serve as a resilience hub.



COMMERCIAL AND RESIDENTIAL FACILITIES

#1 Energy Efficiency and Weatherization Upgrades

PURPOSE	To reduce energy burden for low and moderate income households in the Tulsa MSA, benefitting households directly while significantly reducing GHG emissions.
DESCRIPTION	This project would fund the rehabilitation of residential and commercial structures in LIDAC areas to improve energy efficiency through weatherization, lowering utility bills, and increasing resilience against extreme weather events and climate change.
LIDAC BENEFITS	Reduced utility costs for participating households, reduced exposure to heat-related illness, indoor air quality concerns, and other co-burdens experienced by energy-burdened households.
GHG EMISSIONS REDUCTION ESTIMATE	Approximately 1.25 tons of CO ₂ equivalent emissions per year for each residence weatherized.
GEOGRAPHIC LOCATION	Tulsa MSA
IMPLEMENTING AUTHORITY	Tribal governments, INCOG, Local governments (municipalities and counties), non-profit organizations
POTENTIAL FUNDING SOURCES	Local tax revenues, HUD community development grants, Energy company programs

IMPLEMENTATION COMPONENTS

- 1. Identify neighborhoods of greatest need for energy-efficiency and weatherization rehabilitation.**
 - a. Evaluate existing housing stock for age, condition, and the prevalence of low-income and other disadvantaged statuses.
 - b. Prioritize areas that lack tree canopy coverage.
- 2. Establish criteria for the work that should be produced, the amount of funding available to each resident, and the structure of any grant or loan program.**
 - a. Ensure funding is made available for residents with the greatest needs and fewest financial resources.
- 3. Track program outcomes to inform future investments.**
 - a. Collect energy savings information and anecdotal feedback from program participants to understand project outcomes and inform future funding disbursements.



COMMERCIAL AND RESIDENTIAL FACILITIES

#2 Energy Efficient Building Codes

PURPOSE	To reduce GHG emissions from energy use in building operations.
DESCRIPTION	This project would encourage the adoption of newer more energy efficient building codes by municipalities and Counties in the Tulsa MSA.
LIDAC BENEFITS	Lower energy cost burden, better insulation from extreme weather events, increased workforce opportunities
GHG EMISSIONS REDUCTION ESTIMATE	Approximately 199,034 metric tons of CO ₂ e by 2030, and 392,170 metric tons of CO ₂ e by 2050
GEOGRAPHIC LOCATION	Tulsa MSA
IMPLEMENTING AUTHORITY	State of Oklahoma, INCOG, Local governments (municipalities and counties)
POTENTIAL FUNDING SOURCES	In-kind time of government staff and elected/appointed officials

IMPLEMENTATION COMPONENTS

- 1. Work with communities to adopt the most up-to-date building codes that prioritize energy efficiency.**
 - a. Create a recurring meeting with relevant stakeholders to share progress on code updates, lessons learned from early adopters, and strategies to encourage further adoption across the region.
- 2. Provide incentives for developers that demonstrate efforts to go beyond the base requirements of older building codes.**
 - a. Establish criteria for participation in an incentive program and the amount of funds to be set-aside for incentives.
 - b. Create branding to be displayed on buildings that demonstrate high energy efficiency design.



NATURAL LANDS

#1 Increase Tree Canopy and Other Vegetation

PURPOSE	To sequester GHG emissions and reduce the Urban Heat-Island Effect.
DESCRIPTION	This project would fund the planting, siting, and maintenance of native vegetation across the Tulsa region with a focus on areas that lack significant tree canopy coverage and riparian areas.
LIDAC BENEFITS	Neighborhood beautification, decreased energy usage and costs, extreme heat reduction
GHG EMISSIONS REDUCTION ESTIMATE	Approximately 1,203,446.5 metric tons of CO ₂ e by 2050
GEOGRAPHIC LOCATION	Tulsa MSA
IMPLEMENTING AUTHORITY	Tribal governments, Local government (municipalities and counties), non-profit organizations
POTENTIAL FUNDING SOURCES	Local tax revenue

IMPLEMENTATION COMPONENTS

- 1. Develop a “Neighborhoods” program.**
 - a. Promote community development in addition to greenhouse gas emission reductions by hosting tree planting events in neighborhoods most negatively impacted by the downstream effects of greenhouse gas emissions.
 - b. Prioritize neighborhoods that are in proximity to industrial emitters.
- 2. Increase native trees and grasses, and protect and restore riparian areas.**
 - a. Work with municipalities to ensure that trees and plants planted in public parks, rights-of-way, and other public locations are native species.
 - b. Work with non-profit organizations to build upon existing efforts to restore riparian areas.
 - c. Implement policies designed to protect existing undeveloped riparian areas.
 - d. Promote the adoption and implementation of green infrastructure within the region.

4. LIDAC BENEFITS ANALYSIS

Based on the greenhouse gas emissions reduction measures identified in Section 3 of this PCAP, there are significant potential benefits for LIDAC residents in the Tulsa MSA.

The three projects in the Transportation category, if implemented, will reduce various emissions from automobiles, including ozone precursors, particulate matter, and greenhouse gases. These reductions will lead to improved health outcomes for LIDAC residents by reducing rates of asthma and other respiratory conditions. Additionally, enhancements to public transit systems and rebates for electric vehicle purchases will increase physical and economic mobility by reducing costs associated with transportation.

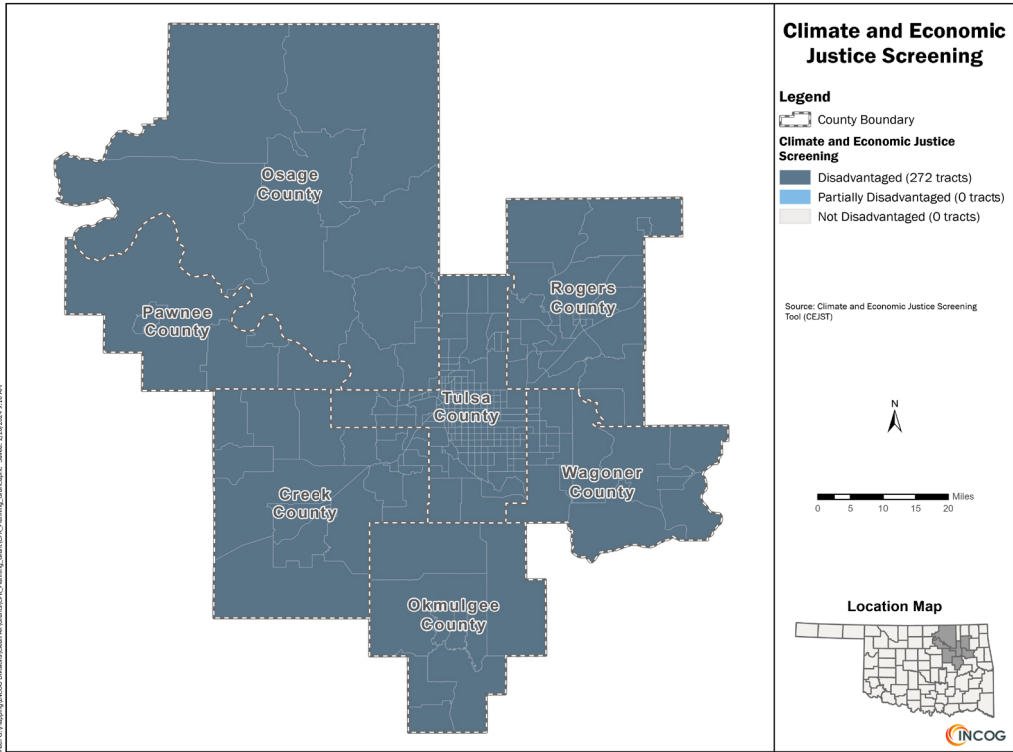
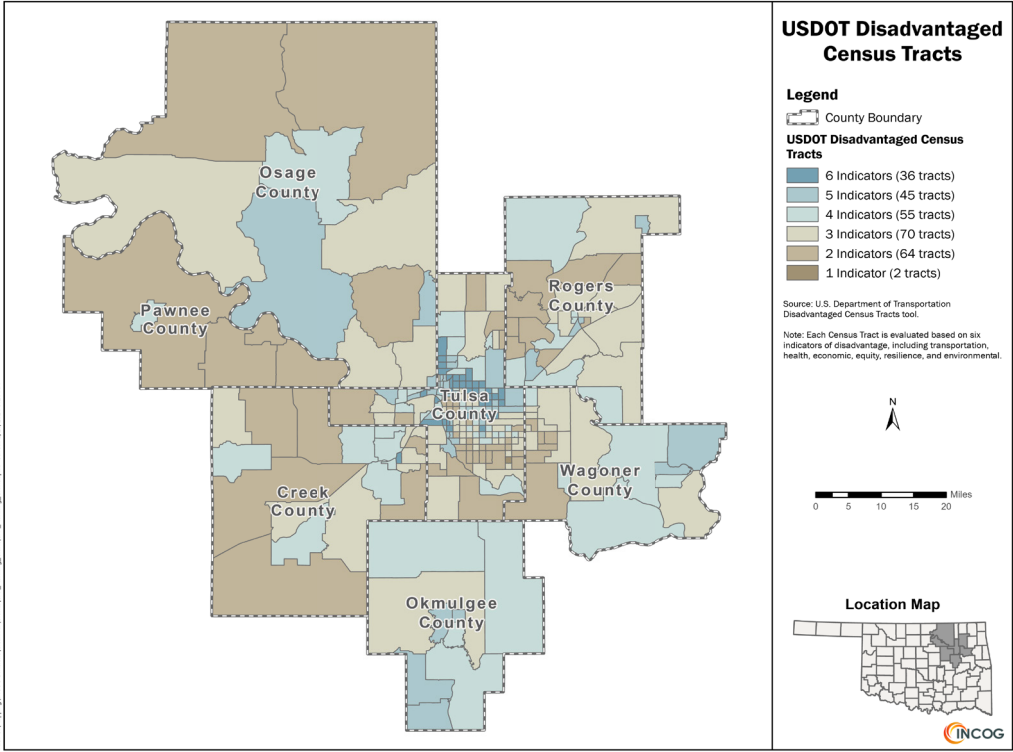
The two projects in the Waste Management category will increase LIDAC residents' opportunities to divert waste from landfills, and the composting component of the first Waste Management project can be used to enhance community gardening and urban farming activities in LIDAC areas of the region, increasing the opportunity for healthy food options in food deserts across the city.

The Resilience Hubs project in the Government Facilities section of the reduction measures offers many benefits specifically targeted at LIDAC residents. These locations would serve as resources for LIDAC residents for protection during extreme heat and other weather events, as well as venues for trainings for residents to learn how to reduce greenhouse gas emissions, improve resilience, and lower energy bills in their homes and neighborhoods. This will have the added benefit of increasing connections between neighborhood residents, which adds resilience to emergency response activities during natural disasters.

The Energy Efficiency and Weatherization project in the Commercial and Residential Facilities section of the reduction measures specifically targets benefits to low-income households by reducing utility costs and exposure to heat-related illnesses, mitigating indoor air quality concerns, and reducing other co-burdens experienced by energy-burdened households.

Finally, the project in the Natural Lands section of the reduction measures will increase tree canopy and other vegetation in LIDAC neighborhoods, further decreasing energy usage and costs, as well as mitigating against the Urban Heat Island Effect.

Because there are five American Indian tribal reservations that overlap with the Tulsa MSA, the entire Tulsa MSA is considered Disadvantaged according to the Climate and Economic Justice Screening Tool. However, when determining which geographies to prioritize for projects to ensure LIDAC benefits, it is important to distinguish between locations based on the number of disadvantages faced. By mapping the number of disadvantages, focus areas emerge in the Tulsa MSA. In particular, North Tulsa and East Tulsa, as well as unincorporated rural areas in Osage County, Okmulgee County, and Wagoner County, face the greatest disadvantages in the region.



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5. REVIEW OF AUTHORITY TO IMPLEMENT

The PCAP GHG reduction strategies were selected with the authority to implement as a significant determinant to their inclusion in the plan. The PCAP includes emission reduction measures that were informed by community members and stakeholders aware of the \$4.6 billion EPA CPRG Implementation Grant program and the resources available to eligible entities to fund GHG reduction projects. Eligible entities include Tribal Nations, Territories, States, and Local Governments. If an implementation grant is pursued for any measure identified in the PCAP, it is anticipated the eligible entities would be a tribal nation, state agency, or local government or a coalition and/or partnership of organizations. All GHG emission reduction programs would be structured in a manner to ensure that the eligible entity or coalition would have the authority to implement one or more components of this measures directly and/or provide resources to entities that could implement components of the measures.



Sources and References

All demographic data sourced from US Census Bureau American Community Survey 5-year (2018-2022) through mySidewalk.

Greenhouse Gas Inventory and Quantified Reduction Measures

Graves, R. A., Haugo, R. D., Holz, A., Jones, A. M., Kellogg, B., MacDonald, C., ... & Schindel, M. (2020). Potential greenhouse gas reductions from natural climate solutions in Oregon, USA. *Plos One*, *15*(4), e0230424. <https://doi.org/10.1371/journal.pone.0230424>

National Land Cover Database (NLCD) 2019 Land Cover (June 4, 2021 version); Riparian Zone (June 2022 Version)

U.S. Environmental Protection Agency, 2013, Level III ecoregions of the continental United States (revision of Omernik, 1987): Corvallis, Oregon, USEPA – National Health and Environmental Effects Research Laboratory, various scales, <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states>.

EPA. Number of urban tree seedlings grown for 10 years (Calculations). 2024.
Greenhouse Gases Equivalencies Calculator - Calculations and References | US EPA.

McPherson, E. G.; van D. N. S.; Peper, P. J. (2016). Urban tree database and allometric equations. Gen. Tech. Rep. PSW-GTR-253. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 86 p.

U.S. DOE (1998). Method for Calculating Carbon Sequestration by Trees in Urban and Suburban Settings. Voluntary Reporting of Greenhouse Gases, U.S. Department of Energy, Energy Information Administration (16 pp, 111K, About PDF).

EPA(2024). Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022 U.S. Environmental Protection Agency, EPA 430-D-24-001.<https://www.epa.gov/ghgemissions/draft-inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022>.

Bradshaw, Jonathan L; Elie Bou-Zeid. 2016. Greenhouse gas mitigation benefits and cost-effectiveness of weatherization treatments for low-income, American, urban, housing stocks. (Page 20). https://www.researchgate.net/publication/305653132_Greenhouse_gas_mitigation_benefits_and_cost-effectiveness_of_weatherization_treatments_for_low-income_American_urban_housing_stocks.

Department of Transportation, Metropolitan Tulsa Transit Authority. 2022 Annual Agency Profile. 2022. 60018.pdf (dot.gov).

Natural Gas Emission Factors. EPA. 2024. Emission Factors for Greenhouse Gas Inventories (epa.gov).

National Emissions Inventory Report. EPA. 2017. 2017 National Emissions Inventory Report (epa.gov).

Downey, Jim. 2021. Power Systems Research, Current State of U.S. Lawn & Garden Equipment Market. <https://www.oemoffhighway.com/market-analysis/industry-news/forestry-lawn/article/21591227/current-state-of-the-us-lawn-garden-equipment-market>.

Institute for Market Transformation. 2024. Energy-Efficient Codes Coalition. Building Energy Code Saving Calculator. <https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.imt.org%2Fwp-content%2Fuploads%2F2020%2F12%2FBuilding-Energy-Code-Emissions-Calculator-2020.xlsm&wdOrigin=BROWSELINK>.

Research and Markets. 2019. Growing U.S. Electric Lawn Mower Market. <https://www.oemoffhighway.com/market-analysis/industry-news/forestry-lawn/news/21083351/growing-us-electric-lawn-mower-market>

