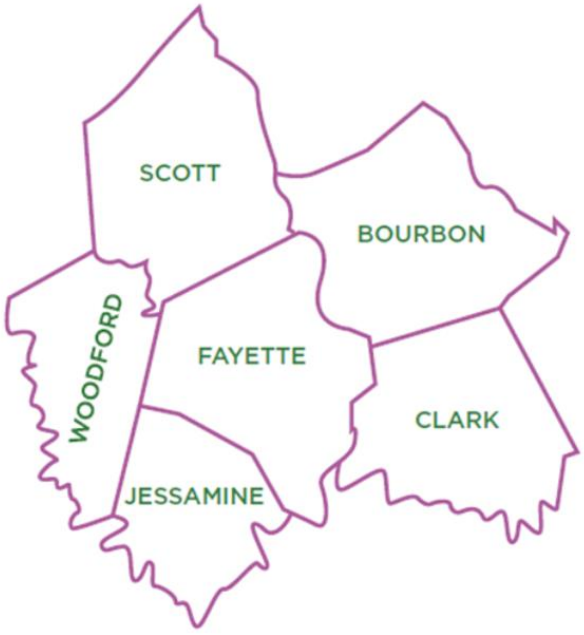
Lexington-Fayette Metropolitan Statistical Area Priority Climate Action Plan



Presented by

LEXINGTON

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February 29, 2024

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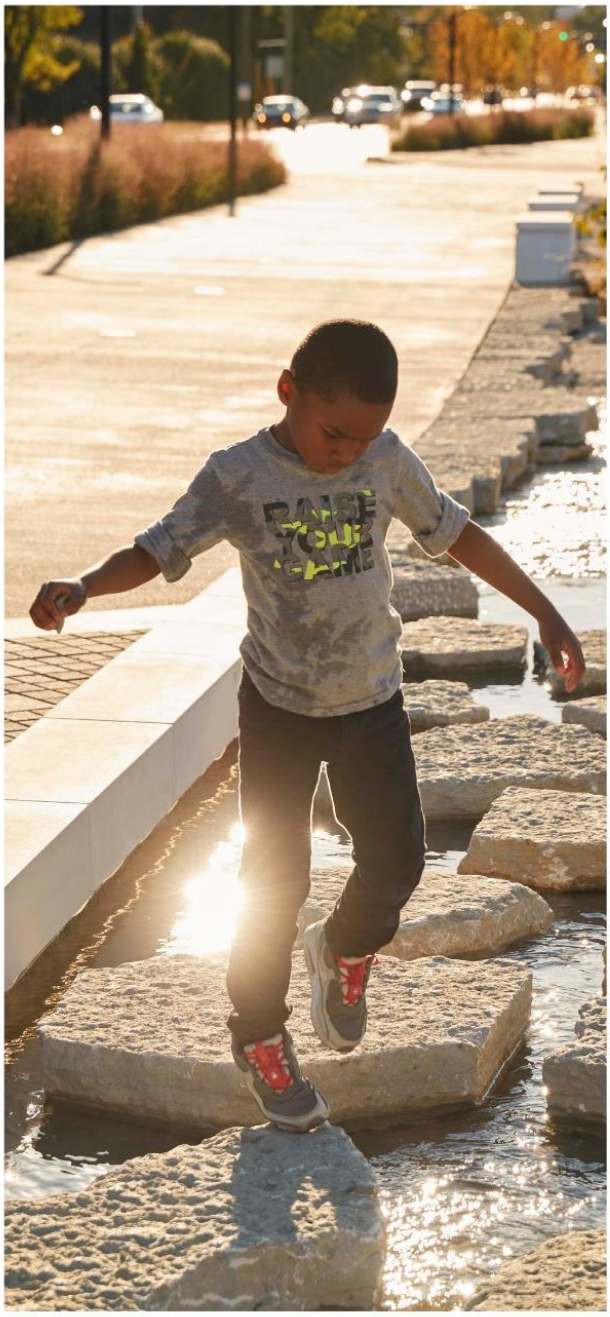
RAISE
YOUR
GAME

Acknowledgments

This is an adaptation of a template prepared for states by the Conveners Network. This template was prepared in collaboration with the Urban Sustainability Directors Network, which provides technical assistance and support to MSAs on Climate Pollution Reduction Grant (CPRG) planning through the CPRG Assistance Project—a collaboration of several organizations to provide free support to help MSA leads navigate and successfully comply with the CPRG program.

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Appendices

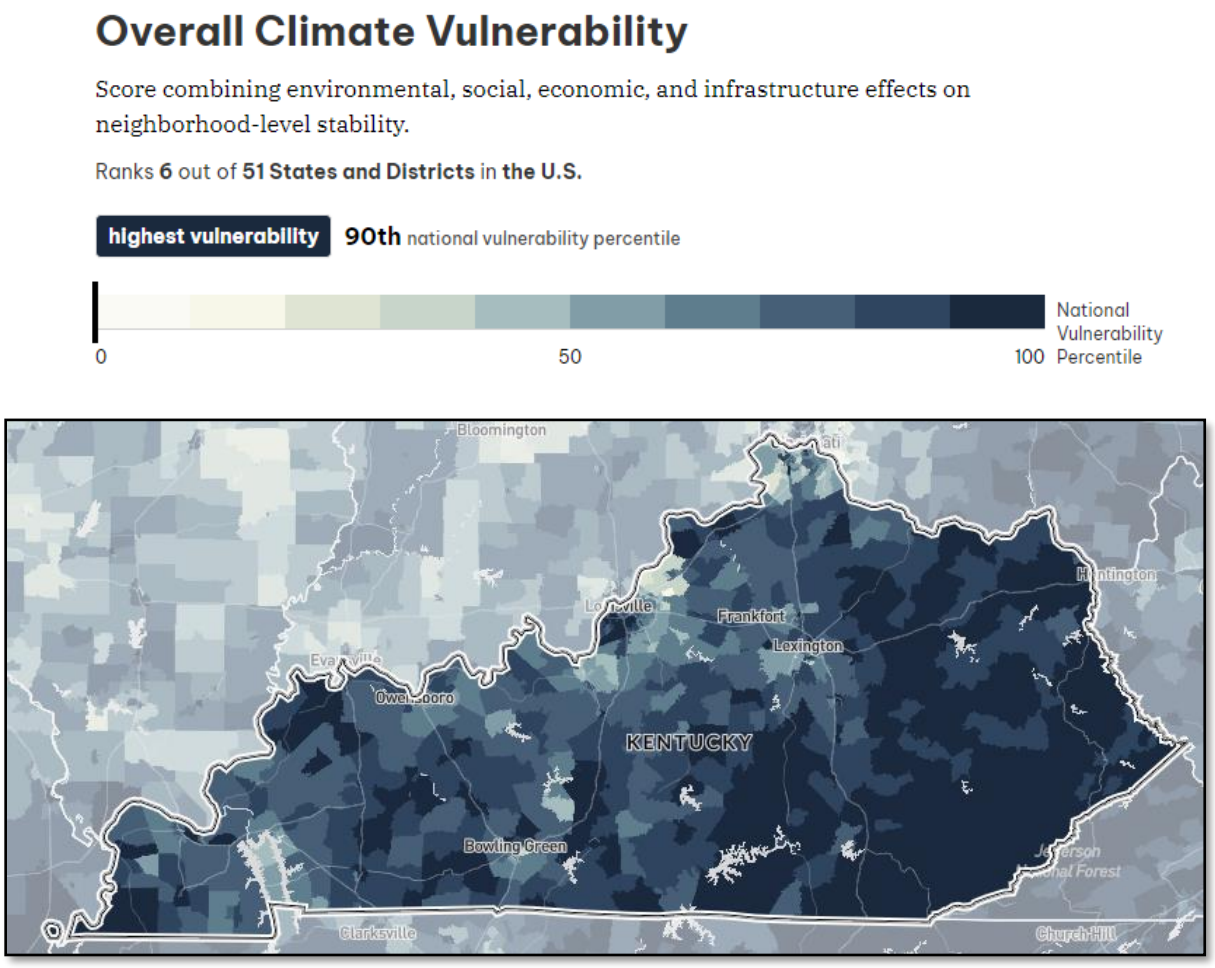
Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AMI	Area Median Income
CCAP	Comprehensive Climate Action Plan
CEJST	Climate and Economic Justice Screening Tool
CO2	Carbon Dioxide
CPRG	Climate Pollution Reduction Grant
CVI	Climate Vulnerability Index
DOE	U.S. Department of Energy
eGRID	Emissions & Generation Resource Integrated Database
EJScreen	Environmental Justice Screening and Mapping Tool
EPA	U.S. Environmental Protection Agency
EVs	Electric Vehicles
FLIGHT	Facility Level Information on Greenhouse Gases Tool
GHG	Greenhouse Gas
GPC	Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories
HUD	U.S. Department of Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
IRA	Inflation Reduction Act
KAEE	Kentucky Association for Environmental Education
KYSES	Kentucky Solar Energy Society
LEED	Leadership in Energy and Environmental Design
LFUCG	Lexington-Fayette Urban County Government
LGGIT	Local Greenhouse Gas Inventory Tool
LIDAC	Low-Income & Disadvantaged Communities
MSA	Metropolitan Statistical Area
MT CO2e	Metric Tons of Carbon Dioxide Equivalent
NEI	National Emissions Inventory
NEVI	National Electric Vehicle Infrastructure Formula Program
PCAP	Priority Climate Action Plan
PVs	Photovoltaics
SLOPE	State and Local Planning for Energy
VMT	Vehicle Miles Traveled

INTRODUCTION

Kentucky ranks #6 overall out of 51 states and districts in the U.S. Climate Vulnerability Index (CVI). The index is a measure of environmental, social, economic, and infrastructure impacts affecting a community's ability to respond and adapt to climate change.

What is "climate vulnerability"? The evolving climate is exacerbating both infectious and chronic illnesses, heightening societal and economic pressures, and amplifying the intensity of extreme weather occurrences. While certain communities in the United States possess access to resources that aid in their preparation for, endurance of, and recovery from these impacts, many others do not. These communities are disproportionately vulnerable to climate-related effects due to a legacy of racially biased housing and infrastructure development, unequal application of environmental regulations, discriminatory practices in the labor market, and other systemic injustices.



Source: The U.S. Climate Vulnerability Index

INTRODUCTION

However, with this challenge comes an opportunity to invest in a cleaner economy that can spur innovation and economic growth while building more equitable, resilient communities. Through the Inflation Reduction Act (IRA) of 2022, Congress provided many tools to pursue greenhouse gas (GHG) pollution reductions, including the Climate Pollution Reduction Grant (CPRG) program. In implementing this and many other programs under the IRA, the U.S. Environmental Protection Agency (EPA) seeks to achieve three broad objectives:

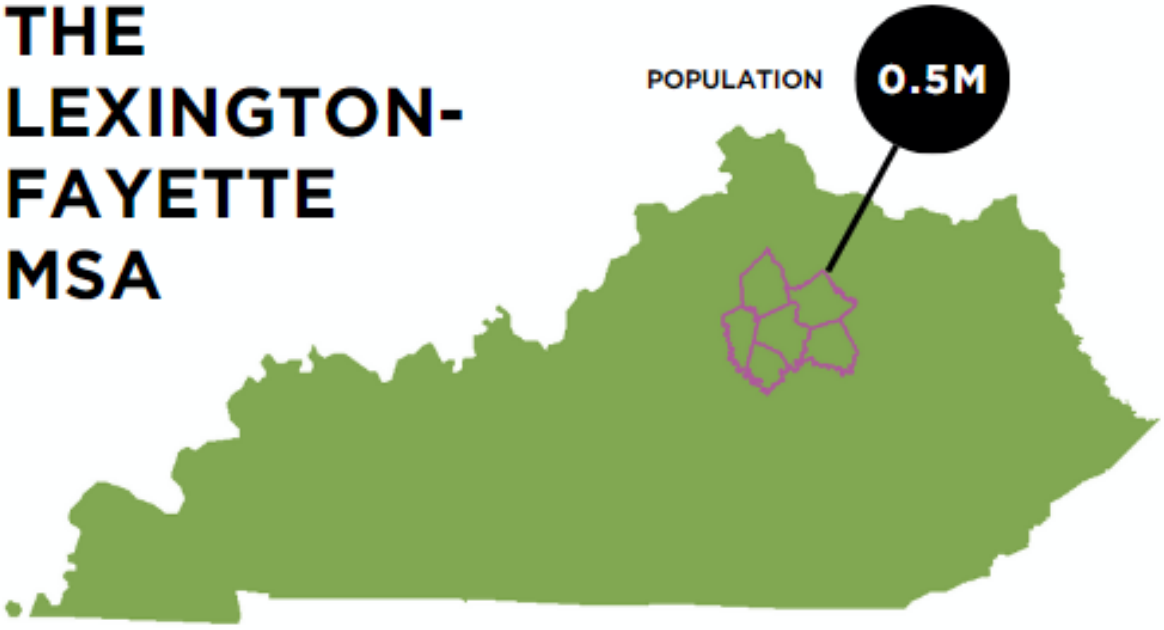
- Tackle damaging climate pollution while supporting the creation of good jobs and lowering energy costs for families.
- Accelerate work to address environmental injustice and empower community-driven solutions in overburdened neighborhoods.
- Deliver cleaner air by reducing harmful air pollution in places where people live, work, play, and go to school.

The Lexington-Fayette Metropolitan Statistical Area (MSA) was awarded a Planning Grant from the CPRG program. There are two phases of the CPRG program. Phase 1 of the CPRG program requires submittal of a Priority Climate Action Plan (PCAP). The PCAP is a narrative report including a focused list of near-term, high-priority, implementation-ready measures to reduce GHG pollution, a simplified GHG inventory for the entire MSA, emissions reductions associated with the proposed implementation measures, a low-income and disadvantaged communities (LIDAC) benefit analysis, and a review of the authority to implement these measures.

Phase 2 of the program will expand the PCAP into a Comprehensive Climate Action Plan (CCAP). The CCAP will touch on all significant GHG sources, sinks, and sectors present in the MSA, establish near-term and long-term GHG emission reduction goals, and provide strategies and measures to achieve those goals. The MSA will undertake a comprehensive public outreach and involvement campaign in order to receive feedback from stakeholders, with a focus on LIDACs. The CCAP will be a plan for the community, by the community, that will hold the promise of preserving the place we live and love for years to come.

This strategy will allow communities across the country to make the inevitable changes needed to address climate change and make them opportunities to revitalize the U.S. energy and manufacturing sectors, create millions of good-paying jobs throughout the country, and address historic environmental injustices and inequities.

INTRODUCTION



The Lexington-Fayette MSA is located in the heart of Kentucky. It encompasses the six-county area of Bourbon, Clark, Fayette, Jessamine, Scott, and Woodford Counties. According to the U.S. Census Bureau, Kentucky had a population of 4,506,589 in 2021,[1] with the Lexington-Fayette MSA accounting for 517,508, or approximately 11.5% of the state population.

When initially established by the U.S. Census Bureau in 1950, the MSA was comprised of only Fayette County. However, by 1980, neighboring counties experienced population growth and a rise in residents employed within Lexington-Fayette County and thus met the Census criteria for inclusion in the MSA. Since the 1980 Census, the MSA has experienced year over year growth. The Kentucky State Data Center estimates that the population of the MSA will increase 26% by 2050.[2] **Table 1-1** on the following page shows the estimated population delta by county and overall.

[1] https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html
[2] https://louisville.app.box.com/s/ndp7uvqbi6xtsv1sd2ylntvaer02kklq

Table 1-1 – Current and Projected Populations

County	Population (2021)	Population (2050)	% Change
Bourbon	20,218	19,207	-5.0%
Clark	36,925	38,047	+3.0%
Fayette	321,354	398,219	+23.9%
Jessamine	53,609	64,162	+20.0%
Scott	58,312	102,616	+76.0%
Woodford	27,090	29,569	+9.2%
TOTAL	**517,508**	**651,820**	**+26.0%**

As the largest municipality in the MSA, the Lexington-Fayette Urban County Government (LFUCG) is designated as the lead agency to oversee and maintain responsibility for the management of the grant funds, activities, and deliverables. LFUCG has partnered with municipalities across the MSA to develop this PCAP. This plan is designed to support investment in policies, practices, and technologies that reduce pollutant emissions, create high-quality jobs, spur economic growth, and enhance the quality of life in Central Kentucky.

The measures contained herein should be construed as broadly available to any entity within the geographic scope of this PCAP eligible to receive funding under the EPA's CPRG Implementation Grant General Competition and other funding streams, as applicable.

This PCAP is organized into six sections:

1. **Introduction**
2. **LIDAC Analysis**
3. **GHG Emissions Inventory**
4. **Priority Measures**
5. **Coordination and Outreach**
6. **Conclusion**

Low-Income and Disadvantaged Community Analysis

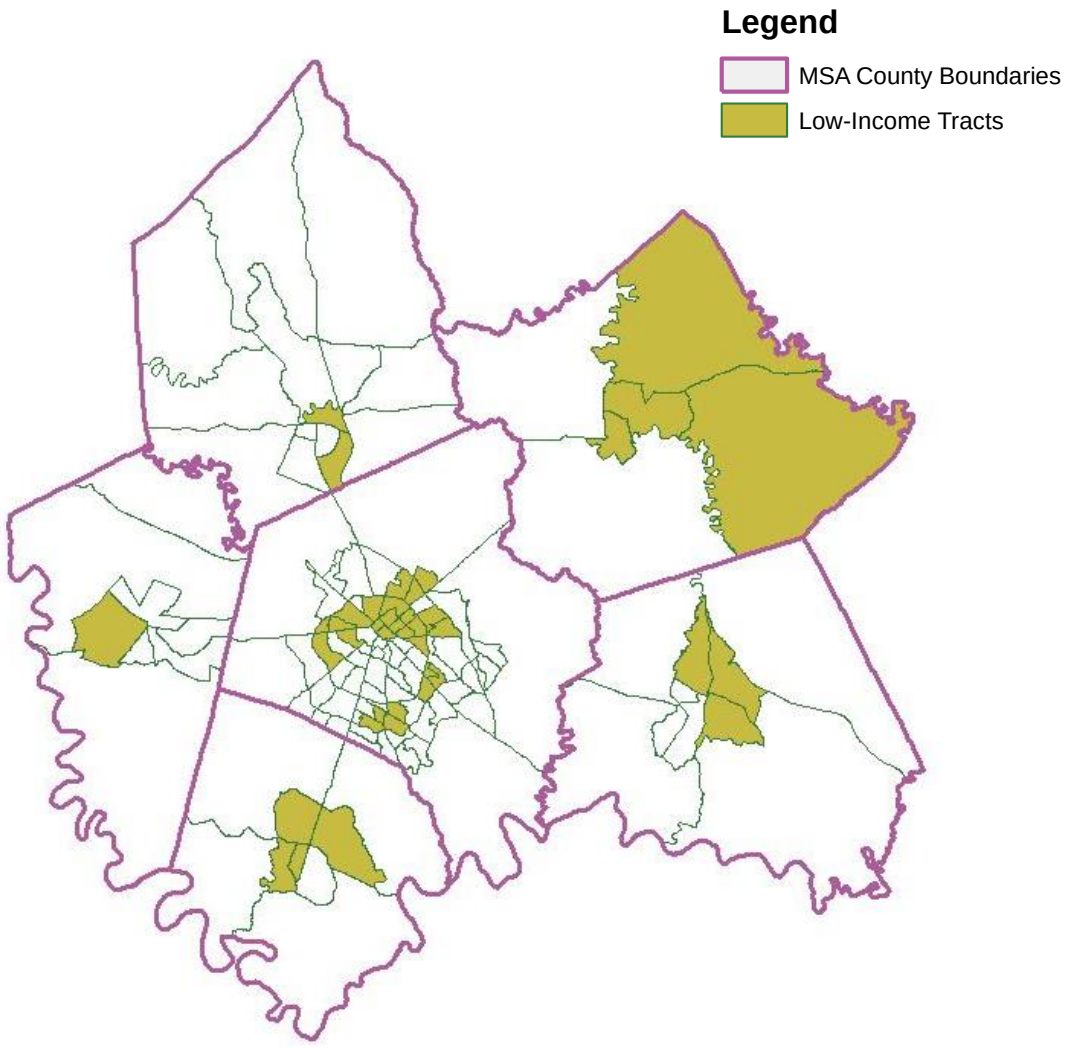
In January of 2021, President Biden issued Executive Order 14008, the Justice40 Initiative, committing to deliver 40% of the overall benefits of investments in climate, clean energy, and related areas to disadvantaged communities. The Climate and Economic Justice Screening Tool (CEJST) was developed as part of the initiative. The tool uses datasets that are indicators of burdens in eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development.

Table 2-1 below summarizes the population and number of LIDAC tracts for each county within the MSA. See Appendix E for a list of the individual tracts identified for each county.

Table 2-1 – LIDAC Tracts

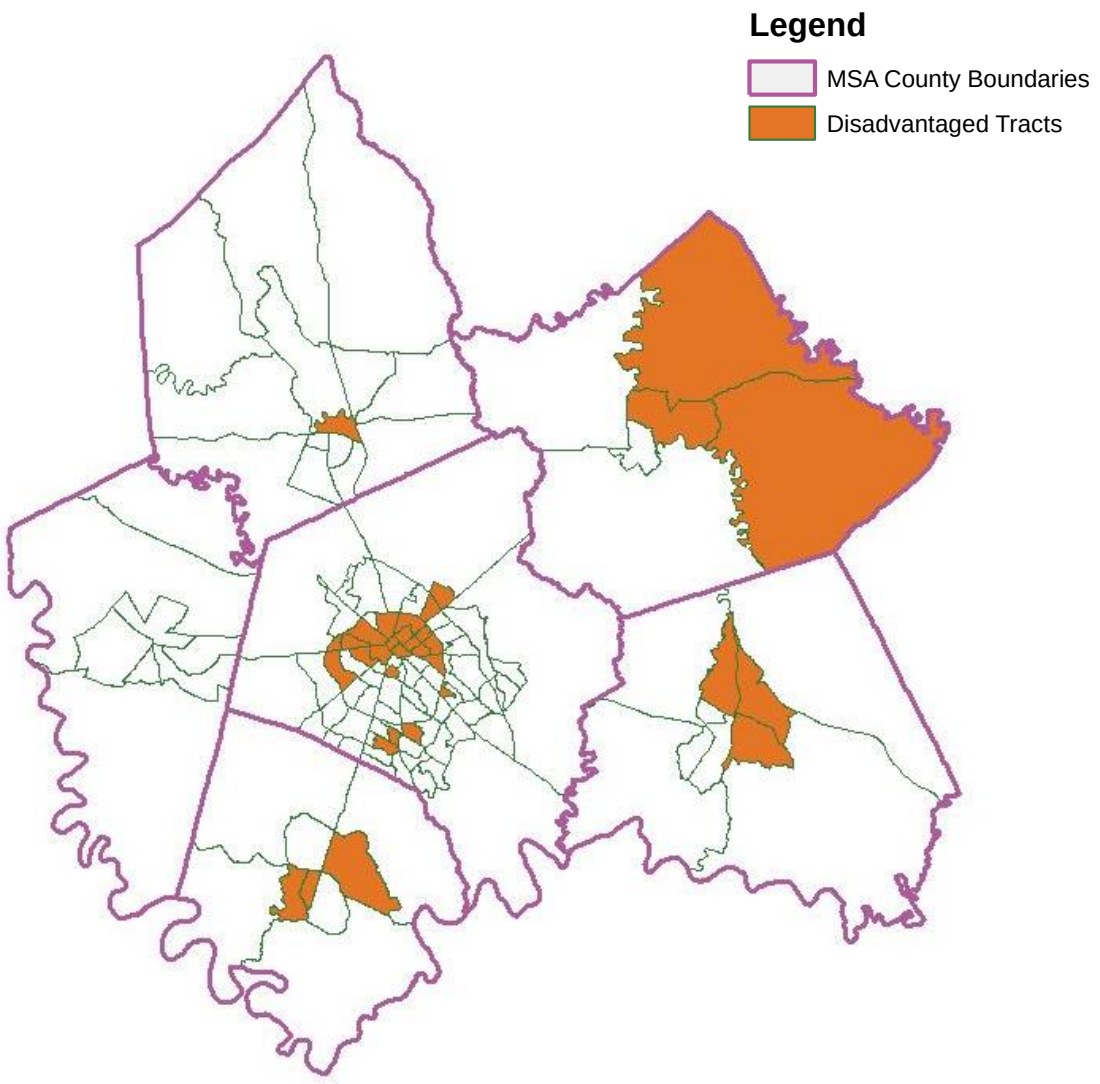
County	Total Population (2021)	Low-Income Tracts	Population	Disadvantaged Tracts	Population
Bourbon	20,218	4	14,681	3	8,460
Clark	36,925	3	10,261	3	10,261
Fayette	321,354	27	99,419	23	77,815
Jessamine	53,609	4	23,964	3	15,563
Scott	58,312	2	8,882	1	4,121
Woodford	27,090	1	3,558	0	0
TOTAL	**517,508**	**41**	**160,765**	**33**	**116,220**

Low-Income Tracts in Lexington-Fayette MSA



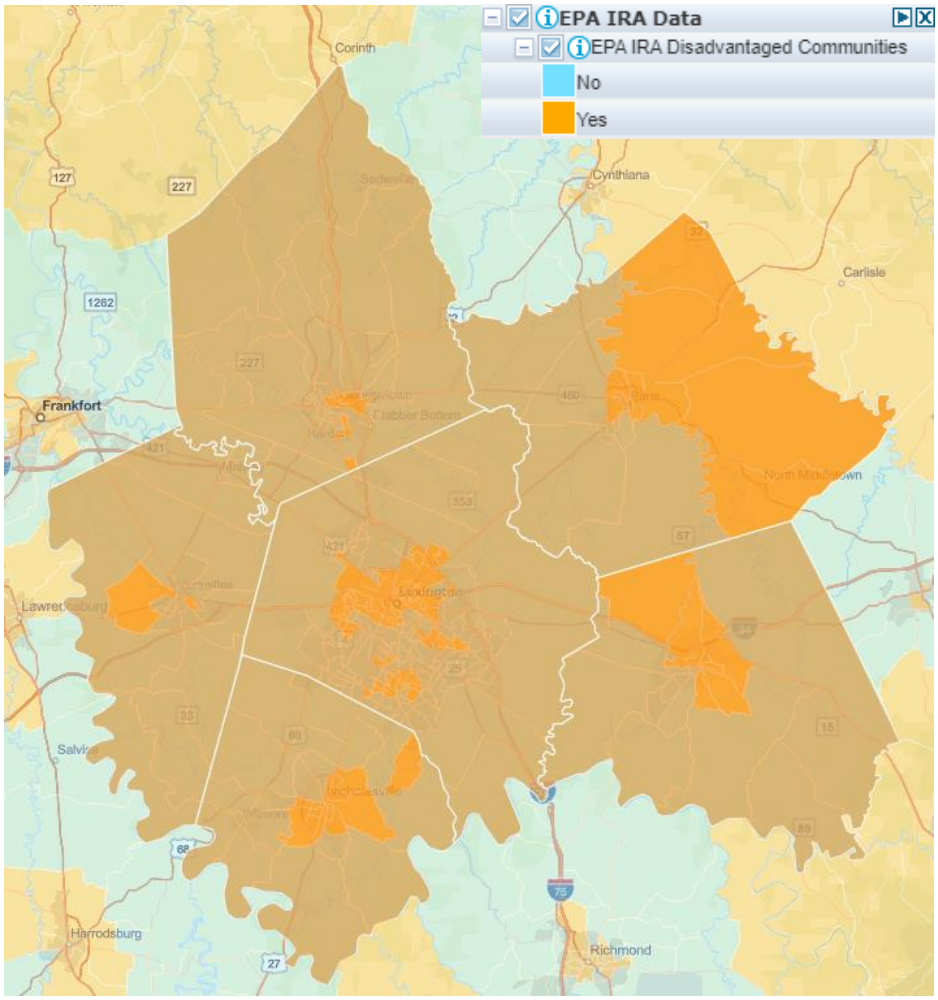
Communities are defined as low income by the CEJST if they are in, or above, the 65th percentile of Census tracts that have people in households whose income is less than or equal to twice the federal poverty level (not including students enrolled in higher education). The Lexington-Fayette MSA has 41 tracts classified as low income with a total population of 160,765, or approximately 31.1% of the entire population.

Disadvantaged Tracts



Version 1.0 of CEJST, defines communities as disadvantaged if they are in Census tracts that meet the thresholds for at least one of the tool's categories of burden, or if they are on land within the boundaries of Federally Recognized Tribes. In addition, Census tracts that are completely surrounded by disadvantaged communities are also considered disadvantaged if they meet an adjusted low-income threshold. Therefore, disadvantaged tracts are not a direct subset of low-income tracts. The Lexington-Fayette MSA has 33 tracts classified as low income with a total population of 116,220, or approximately 22.5% of the entire population.

Environmental Justice Screening and Mapping Tool



The EPA also maintains the Environmental Justice Screening and Mapping Tool (EJScreen). The tool features a dataset of disadvantaged communities as defined by the IRA. In addition to Census tracts identified as disadvantaged by the CEJST, this definition also includes any Census block group at or above the 90th percentile for any of EJScreen's Supplemental Indexes when compared to the nation or state and any geographic areas within Tribal lands. These tracts are shown in orange in the figure above. The complete EJScreen reports for each county are included in Appendix E.

GHG Emissions Inventory

The Lexington-Fayette MSA has developed an inventory of priority sources of GHG emissions within the area. This inventory was prepared using the following data resources:

- EPA's Local GHG Inventory Tool (LGGIT),[3]
- Facility-specific GHG data published by the EPA in the Facility Level Information on Greenhouse Gases tool (FLIGHT),[4]
- Data reported to the EPA's Greenhouse Gas Reporting Program,[5]
- EPA's National Emissions Inventory (NEI),[6]
- U.S. Department of Energy State and Local Planning for Energy (SLOPE) Platform,[7]
- The Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC),[8] and,
- Other local sources.

LFUCG recently completed a community-wide inventory for calendar year 2021. Since some data from this inventory could be reused, it was decided to use 2021 for the baseline Lexington-Fayette MSA simplified inventory. Detailed quality assurance procedures and methodology for the preparation of this inventory are contained in Appendix A and Appendix B, respectively.

The inventory includes the following sectors and gases:

Sectors	***GHGs (across all sectors)***
Electricity Consumption	carbon dioxide (CO_2),
Stationary Combustion	methane (CH_4),
Transportation	nitrous oxide (N_2O),
Waste & Wastewater	fluorinated gases (F-gases), including
Agriculture	hydrofluorocarbons (HFCs), perfluorocarbons (PFCs),
Industry	sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3)

Results are displayed in metric tons of carbon dioxide equivalent (MT CO2e) for simplicity.

[3] https://www.epa.gov/statelocalenergy/local-greenhouse-gas-inventory-tool
[4] https://ghgdata.epa.gov/ghgp/main.do
[5] https://www.epa.gov/ghgreporting/data-sets
[6] https://www.epa.gov/air-emissions-inventories/national-emissions-inventory-nei
[7] https://maps.nrel.gov/slope
[8] https://ghgprotocol.org/ghg-protocol-cities

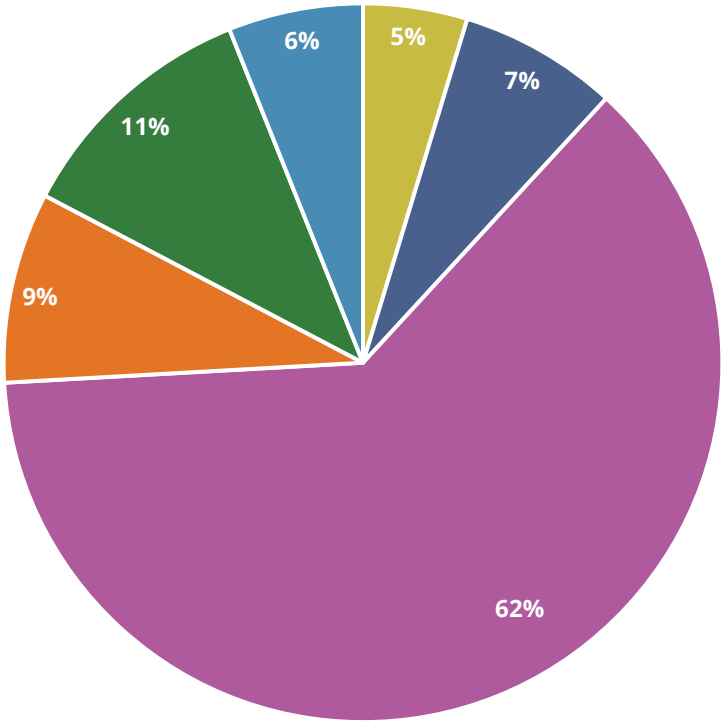
Table 3-1 – Lexington-Fayette MSA GHG Inventory for Calendar Year 2021

Sector	Bourbon	Clark	Fayette	Jessamine	Scott	Woodford	TOTAL
Electricity Consumption	**221,571**	**400,201**	**4,324,281**	**589,946**	**495,386**	**342,365**	**6,373,750**
Electricity Usage	221,206	399,533	4,318,471	588,977	493,936	341,778	6,363,901
Electrical Transmission	365	668	5,809	969	1,054	490	9,355
Imported Water	-	-	-	-	396	97	493
Stationary Combustion	**60,008**	**61,467**	**772,068**	**92,877**	**139,422**	**59,373**	**1,185,215**
Natural Gas	60,008	61,467	772,068	92,877	139,422	59,373	1,185,215
Transportation	**95,937**	**201,000**	**1,509,850**	**196,915**	**334,105**	**180,111**	**2,517,919**
On-Road	77,565	174,424	1,128,196	151,350	298,844	159,508	1,989,888
Non-Road	18,373	26,576	211,680	45,565	35,261	20,603	358,057
Aviation	NE	NE	169,974	NE	NE	NE	169,974
Waste & Wastewater	**21,124**	**41,324**	**167,783**	**15,206**	**177,583**	**12,897**	**435,917**
Solid Waste	18,543	37,585	112,108	9,676	171,868	10,118	359,898
Wastewater	2,581	3,739	55,675	5,530	5,715	2,779	76,019
Agriculture	**119,083**	**82,344**	**72,549**	**44,245**	**88,685**	**74,307**	**481,212**
Enteric Fermentation	81,590	52,945	28,191	26,644	43,530	37,210	270,109
Manure Management	27,227	18,089	20,380	13,939	17,538	18,152	115,325
Fertilizers	5,442	12,407	60,789	1,326	28,716	15,404	124,086
Urban Tree Canopy	(3,946)	(3,309)	(42,339)	(4,167)	(5,270)	(1,930)	(60,960)
Burning	8,770	2,211	5,527	6,503	4,170	5,471	32,652
Industry	**10,508**	**19,191**	**167,019**	**27,862**	**30,307**	**14,080**	**268,967**
Ozone Depleting Substances	10,508	19,191	167,019	27,862	30,307	14,080	268,967
TOTAL (MT CO2e)	**528,232**	**805,527**	**7,013,549**	**967,052**	**1,265,488**	**683,133**	**11,262,980**
MT CO2e / Capita	**26.1**	**21.8**	**21.8**	**18.0**	**21.7**	**25.2**	**21.8**

NE = Not Estimated

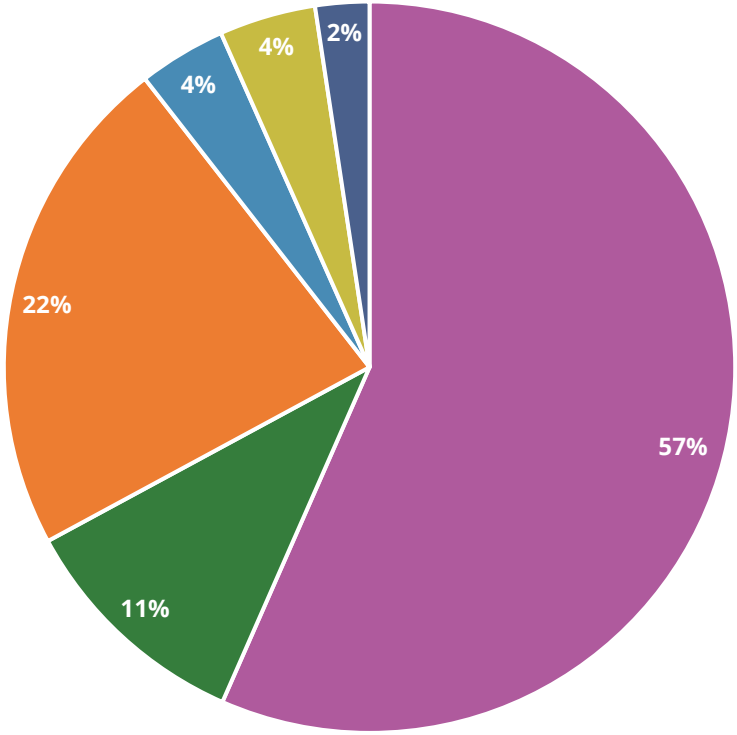
MT CO2e = Metric Tons of Carbon Dioxide Equivalent (CO2e)

Emissions by County



Bourbon County
Clark County
Fayette County
Jessamine County
Scott County
Woodford County

Emissions by Sector



Electricity Consumption
Stationary Combustion
Transportation
Waste & Wastewater
Agriculture
Industry

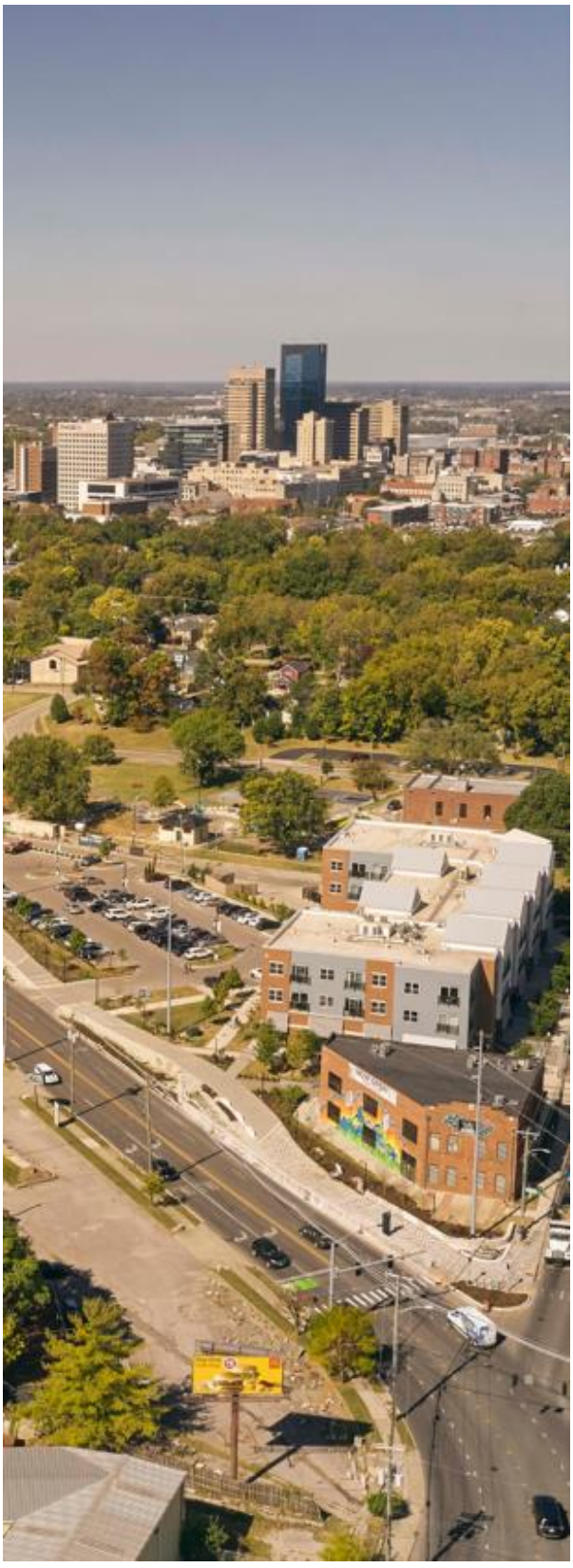
Priority Measures

The measures in this section have been identified as "priority measures" for the purposes of pursuing funding through CPRG Implementation Grants. This list is not exhaustive of the MSA's priorities. Instead, the selected priority measures included in this PCAP meet the following criteria:

- The measure is implementation-ready, meaning that the design work for the policy, program, or project is complete enough that a full scope of work and budget can be included in a CPRG Implementation Grant application.
- The measure can be completed in the near term, meaning that all funds will be expended and the project completed within the five-year performance period for the CPRG Implementation Grants.

Appendix C to this PCAP provides additional details about the following information:

- Methods and assumptions;
- Estimate of the cumulative GHG emission reductions from 2025 through 2030 and 2050; and
- Co-benefits, when possible.



INCREASING URBAN TREE CANOPY

OVERVIEW

Trees provide numerous benefits to the environment and contribute to the overall well-being of ecosystems and communities. They play a crucial role in carbon sequestration, absorbing carbon dioxide during photosynthesis and releasing oxygen, which helps mitigate climate change. They also act as natural air purifiers by filtering pollutants and releasing clean air. The shade provided by trees helps cool the surrounding environment, reducing the urban heat island effect and energy consumption in buildings.

Additionally, trees play a vital role in water management by absorbing and slowing down rainwater, preventing soil erosion and minimizing the risk of floods. Biodiversity flourishes in the presence of trees, as they provide habitats and food sources for various species. Moreover, trees contribute to the aesthetic beauty of landscapes, fostering a sense of well-being and tranquility. Overall, the benefits of trees extend beyond environmental aspects to encompass social, economic, and health-related advantages, making them indispensable for a sustainable and balanced world.

Current Status of Measure

LFUCG recognizes the impact trees have in the community and have implemented several programs aimed at preserving and increasing the tree canopy in the city. Reforest the Bluegrass is an annual tree planting event that has been held since 1999. Over 215,000 trees have been planted by more than 18,000 volunteers. Due to the involvement of the community, fewer than $175,000 in local government funds have been spent towards this accomplishment. Without this support, approximately $1.2 million dollars would have been required for these installations. Sites are maintained by LFUCG over time to ensure the longevity of the plantings.

Reforest at Home started as a by-product of the COVID-19 pandemic, but has continued due to its large success. Reforest at Home provides free tree seedlings for Fayette County residents to plant in their own yards, with a limit of five trees per household. Large shade species and flowering ornamental species are available with a limit of two flowering ornamental species per household.

It is vital to LFUCG to maintain and preserve their investments in the urban tree canopy. LFUCG maintains a list of trees acceptable for planting in various locations and has developed a quiz that residents may take to select the appropriate tree for their circumstances. In addition, a Go See Trees event is hosted annually to showcase the importance of planting the right tree in the right place. LFUCG maintains a Tree Tour Map of trees featured in Go See Trees over the years.

Geographic Scope

The success of these programs in Lexington will facilitate an easy translation to the other counties in the Lexington-Fayette MSA. These communities will be able to organize volunteer events for plantings on public property modeled after the Reforest the Bluegrass program and also provide trees to residents for planting on private properties.

LIDAC Benefits Analysis

Trees are often sparse in neighborhoods with more low-income families and people of color.[9] American Forests developed the Tree Equity Score to address inequities in urban tree canopy distribution. This measure will prioritize Census block groups in each of the urban areas of the MSA with a Tree Equity Score of less than 60. **Table 4-1** contains the number of Census block groups below this threshold in each urban area and the approximate number of trees required to achieve this score.

Table 4-1 – Census Block Groups with Tree Equity Scores <60

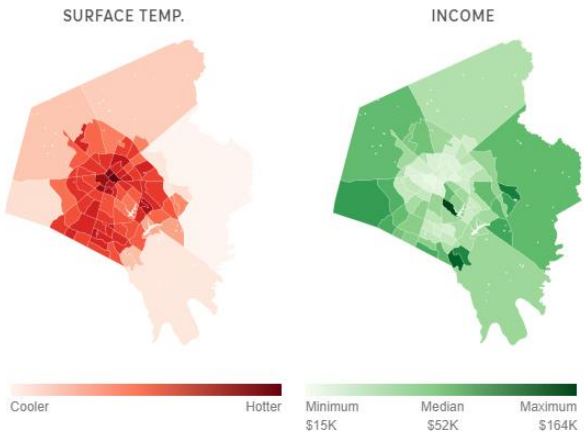
Municipality	Block Groups w/ Tree Equity Scores <60	Population in Block Groups	Trees Required to Achieve Score of 60
Paris	2 of 14	1,004	896
Winchester	4 of 18	6,288	1,361
Lexington-Fayette	2 of 210	1,145	2,899
Nicholasville	13 of 21	21,333	16,297
Wilmore	1 of 6	2,123	1,191
Georgetown	2 of 30	2,002	2,205
Versailles	6 of 13	6,019	5,729
TOTAL	**30 of 312**	**39,914**	**30,578**

Continuing work to increase the urban tree canopy is an investment that will compound. Economic, health, and societal benefits are just a few of the rewards that the community will reap.

[9] https://www.americanforests.org/our-programs/tree-equity/

PRIORITY MEASURES

An article from NPR[10] analyzed the correlation between surface temperature and income in Census tracts. Fayette County was shown to display a strong correlation, meaning Census tracts in our urban core face hotter temperatures as a result of the heat island effect. This leads to increased energy usage and higher electric bills.



The urban tree canopy works to lower the heat island effect and energy usage in a multifaceted approach. Trees provide shade, which cools the surrounding environment by blocking sunlight and reducing direct exposure to solar radiation. Trees also absorb less heat from the sun compared to built surfaces like concrete and asphalt, aiding in the reduction of surface temperatures. Furthermore, trees release water vapor into the air through a process known as evapotranspiration which also works to lower surface temperatures. By reducing the need for artificial cooling systems such as air conditioners, trees help curtail energy consumption and consequently diminish the heat generated by these appliances, which perpetuates the urban heat island effect. The combined cooling effect of these mechanisms results in lower electric bills. Long-term, LFUCG hopes to be able to measure the impacts of tree plantings on energy usage and urban heat islands in neighborhoods.

LIDAC Census tracts generally have higher rates of mental health issues, poorer overall health, and lower life expectancies[11] due to reduced access to health care and economic limitations that affect access to goods and services.

Through a literature review, the Chicago Region Trees Initiative found that research indicates that the presence of trees and greenspace on people can:

- Increase attention, memory, and focus;
- Reduce stress or increase ability to recover from stress;
- Increase life satisfaction and positive thoughts or emotions;
- Increase physical activity; and

[10] https://www.npr.org/2019/09/03/754044732/as-rising-heat-bakes-u-s-cities-the-poor-often-feel-it-most
[11] Economically Disadvantaged Communities | USDA Climate Hubs

- Reduce diastolic blood pressure.

Trees also have a therapeutic effect on communities. Many studies show that a healthy tree canopy can result in lower crime rates.[12] Trees encourage residents to spend time outdoors, fostering a stronger sense of community. Focusing on areas with low Tree Equity Scores will create synergies by providing these aspects to the communities who will benefit most.

Community Concerns

Feedback from the community on this measure was generally positive, but the following concerns were voiced:

- Ensuring trees will not become a hazard to utility lines
- Ensuring trees are planted in appropriate locations for success of the trees
- Ensuring trees are planted in low- to moderate-income areas
- Ensuring protection and longevity of tree plantings
- Ensuring invasive tree species are avoided
- Possible damage from trees to homes

Quantified GHG Reduction Measures

The Tree Equity Score website estimates the annual quantity of carbon dioxide, particulate matter, nitrogen dioxide, sulfur dioxide, and ozone removed as a result of the plantings. It should be noted that the tool uses i-Tree methods for these calculations, which assume medium-sized urban trees. To reap as many benefits as possible from the plantings, the MSA will prioritize ball and burlap tree installations. While more mature than seedlings, it is understood that it will take some years to receive the annual benefits estimated by the Tree Equity Score website. Therefore, the values obtained from the website have been prorated. If the specified number of trees to achieve a Tree Equity Score of 60 for each urban area in the MSA are planted, a 107 MT CO2e by 2030 and 9,512 MT CO2e reduction by 2050 is estimated. See Appendix C for a full methodology on emissions reductions calculations.

[12] The relationship between tree canopy and crime rates

Authority to Implement

This measure will be implemented with existing authority through existing powers of local governments. Budget authority and dedicated funds may need to be respectively increased or created through statute. Memoranda of Agreements will be executed with partnering agencies outlining specific scopes and responsibilities.

Implementation Schedule

The Lexington-Fayette MSA will distribute trees and host planting events at appropriate planting times over the next five years.

PRIORITY MEASURES

RESIDENTIAL SOLAR

OVERVIEW

Electricity-related emissions accounted for the second largest portion (25%) of total U.S. GHG emissions in the last *Inventory of U.S. Greenhouse Gas Emissions and Sinks* report. The combustion of fossil fuels, such as coal, oil, and natural gas, for electricity generation processes releases substantial quantities of carbon dioxide and other GHGs into the atmosphere. These emissions intensify the greenhouse effect, trapping heat and leading to rising global temperatures. Climate change, in turn, can influence energy usage patterns, with rising temperatures often driving greater demand for energy-intensive cooling systems, further exacerbating GHG emissions.

Unlike fossil fuels, renewable energy sources produce minimal or no GHG emissions during operation, offering a pathway to significantly reduce energy-related emissions and mitigate the impacts of climate change. This underscores the urgent need to prioritize the adoption of clean and sustainable energy technologies to build a more resilient and sustainable future.

Current Status of Measure

LFUCG has partnered with the Kentucky Solar Energy Society (KYSES) to launch Solarize Lexington, a program to give homeowners, non-profits, small businesses, and places of worship in Lexington-Fayette County the opportunity to install solar panels and reduce their reliance on the electric grid. KYSES's mission is to promote the use of renewable energy, energy efficiency, and conservation in Kentucky through education, advocacy, networking, and demonstration of practical applications. This program makes investing in solar easy by connecting participants with a vetted solar installer, providing a step-by-step walk-through of the solar installation process, and giving households bulk-purchasing power to obtain discounted wholesale rates (up to 20%) for solar photovoltaics (PV) installation.

The demand for the program has been inspiring. In 2023, 634 interest forms were submitted, 76 contracts were signed (42 grant, 34 non-grant), and 560 kW of PV were installed. The program will re-launch in 2024.

Geographic Scope

KYSES has also partnered with Frankfort-Franklin County and surrounding counties of Anderson, Henry, Owen, and Scott; as well as Louisville-Jefferson County and surrounding counties of Oldham, Spencer, Shelby, and Bullitt. As a result, they have a deep understanding of the region, many lessons learned, and a tried-and-true process that will facilitate a seamless expansion to counties within the Lexington-Fayette MSA that are not already participating.

LIDAC Benefits Analysis

LFUCG's current grant program is only available to low- to moderate-income homeowners. Anyone who owns and occupies their house and whose household income, according to family size, does not exceed the eighty percent (80%) Area Median Income (AMI) as defined by the U.S. Department of Housing and Urban Development (HUD), is eligible to apply for grant funds. This criterion will be recommended for the expanded program.

PRIORITY MEASURES

Every unit of solar electricity produced is one less unit required to be purchased from an electric utility. SolarReviews.com estimates that the average payback period for a solar installation in Kentucky is between five and six years, resulting in an overall 25-year savings of almost $50,000. Leveraging grant funding for initial installation costs will result in even more dollars saved for residents.

The addition of solar panels to homes will also increase property values and stimulate the local economy by creating jobs associated with solar installations.

Coal and natural gas comprise approximately 93% of Kentucky's electricity generation resource mix. The combustion of these materials produces carbon dioxide, sulfur dioxide, nitrogen oxides, and particulate matter. These substances contribute to air pollution and at certain levels can cause shortness of breath, aggravate asthma and other respiratory conditions, and increase the chances of heart attack and stroke.[13]

Particulate matter, specifically small molecules termed "PM2.5" are of particular concern. Prolonged exposure to even low concentrations of PM2.5 has been linked to reduced lung function, particularly in vulnerable populations such as children and the elderly.[14] Additionally, studies have shown that long-term exposure to high levels of PM2.5 can lead to increased mortality rates,[15] underscoring the serious health implications of this air pollutant.

According to EJScreen, all six counties in the MSA have average PM2.5 concentrations above the national average, with several individual tracts in Fayette County being listed above the 95th percentile. See Appendix E for the full EJScreen report for each county. The more we are able to transition to cleaner energy and decrease our reliance on fossil fuels, the more we can reduce the generation of these pollutants.

[13] KY Department for Public Health - Air Quality
[14] NIH National Library of Medicine
[15] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8303514/

Community Concerns

Feedback from the community on this measure was generally positive, but the following concerns were voiced:

- Ensuring energy efficiency of homes selected to optimize energy savings
- Performance of solar panels in the region
- Initial costs and maintenance of installations
- Cooperation of utility companies
- Fraudulent installers

Quantified GHG Reduction Measures

The EPA's Emissions & Generation Resource Integrated Database (eGRID) contains environmental characteristics of electric power generated in the U.S. According to the database, Kentucky has the third highest percentage of coal (68.05%) in the country contributing to their resource mix. The national average for coal contribution to the resource mix is 19.70%. As a result, Kentucky's electricity emission factor is much higher than the national average. Using renewable energy when possible helps to avoid this fossil fuel combustion.

Based on weather patterns for the area, a solar installation in Kentucky can generate approximately 1,550 kWh per year for each kW installed.[16] The KY Energy and Environment Cabinet lists that the average residential system falls between 4 kW and 8 kW.[17] Using an average of 6 kW, each residential solar installation can help avoid approximately 7 MT CO2e annually. The total reduction associated with this measure is variable and depends on the number of homes completed. See Appendix C for potential reductions through 2030 and 2050 based on a set of assumptions.

Authority to Implement

Solarize Lexington is an existing program in Lexington-Fayette County facilitated by the LFUCG Division of Environmental Services. This measure will be implemented with existing authority through existing powers of local governments. Budget authority and dedicated funds may need to be respectively increased or

[16] Solar Panels Kentucky 2024: Estimate cost & savings for your home
[17] Resources for Residential Rooftop Solar

created through statute. Memoranda of Agreements will be executed with partnering agencies outlining specific scopes and responsibilities.

Implementation Schedule

The Lexington-Fayette MSA will implement the program for the next five years. A typical Solarize campaign timeline is shown below:

Project Milestone	**Date**
RFP Released	December 21
Notice of Intent Due	January 16
RFP Question and Answer (Q&A) Session	January 19
RFP Written Question Due in Ionwave	January 23
Deadline to Submit RFP Proposal	**January 25**
Installer Interviews (if needed)	February 1- 2
Selected Installer(s) Announced	February 5
Council Approval & Selected Installer(s) Onboarding	February 5 - March 4
Enrollment & Contracts Begin	**March 12**
Earth Day Week Marketing Blast	April 15-19
Mid-term Campaign Performance Evaluation & Pricing Review	May 13
Any Changes in Selected Installer(s) Announced	June 10
Customer Enrollment Period Ends	**August 9**
Customer Contract Signing Deadline	September 27
Installation Deadline (energized and utility meter swap)	December 31

PRIORITY MEASURES

WEATHERIZATION

OVERVIEW

Weatherization refers to the process of improving the energy efficiency of buildings and homes to make them more resistant to the impacts of weather conditions, such as heat, cold, wind, and precipitation. The goal of weatherization is to reduce energy consumption, lower utility bills, and enhance comfort for occupants.

Weatherization typically involves various measures such as adding insulation to walls, floors, and attics; sealing air leaks around windows, doors, and ductwork; installing energy-efficient lighting and appliances; and improving heating, ventilation, and air conditioning (HVAC) systems. By improving energy efficiency and reducing energy consumption, weatherization not only benefits individual households but also contributes to overall energy conservation efforts and helps mitigate climate change by reducing GHG emissions.

Current Status of Measure

LFUCG has already initiated the development of this program. They have selected a community-based partner organization, Kentucky Association for Environmental Education (KAEE), to assist in managing the development and deployment of the program as well as organizing and evaluating energy consumption and air quality results during the assessment and post-mitigation phases of the project. After securing all project partners and a commercial audit partner through the proper procurement process, LFUCG will engage with homeowners and renters with low- to moderate-income.

Homeowners will need to work with LFUCG's Division of Community and Resident Services for a pre-screening to determine if they are eligible for grant funding. Once a homeowner qualifies to participate in the grant-funded program, LFUCG will work with the homeowner to schedule the initial assessment. The audit company will provide information regarding the energy audit results. The audits will include industry standard evaluation protocol to look for air leakage, drafts, assessing HVAC systems, and evaluating the home's insulation. Tests/surveys such as blower door tests, combustion safety tests, and insulation surveys will likely be included in the audit and any quantitative/measurable data will be recorded and provided to the homeowner in an Energy Audit Summary Report. In addition, the report will have a prioritized list of recommendations that the homeowner will use to contract services to fix/remediate/weatherize, etc. This list will serve as a menu of options for the homeowner to choose from that will be direct and easy to understand.

Each homeowner that finishes the assessment process will have an established and maximum budget to spend on improvement projects. After each homeowner has a chance to review the findings of their audit summary report, LFUCG and KAEE will work with each homeowner to review the recommendations and discuss the types of projects that the homeowner feels they would like to use grant funding to accomplish. It is critical that the homeowner be invested in this process and select those focus areas that they feel are the best for their home at that time. Homeowners will be provided a list of vetted contractors to obtain quotes for their home. The list will be created with the assistance of the audit company and our project partners. The homeowner will also have the option of purchasing supplies and completing simple home projects on their own (with pre-approval from LFUCG

and KAEE). Some of the potential fixes may cost more than the grant funding provided (such as HVAC system replacement). In these cases, if the chosen mitigation activity is more than funding allows, the funding will only pay the contractor the portion of the money from the grant and the homeowner would be responsible for paying any non-grant portion of the cost. However, it is the goal of this program to provide the homeowner various improvement options that do not require any investment on their part.

After completing chosen improvement projects, the audit company will collect post-mitigation data as appropriate. These post-mitigation assessments will provide the measurements needed to track progress and improvement in air quality and energy efficiency for each home. After projects have been completed, homeowners would be responsible for turning in receipts/invoices and proof of completed work in order to obtain reimbursement (up to the allocated budget per household).

Geographic Scope

With this framework in place, this measure could easily be expanded to all counties in the MSA.

LIDAC Benefits Analysis

Low-income households typically spend 17% of their total annual income on residential energy costs, compared with 4% for other households.[18] Weatherization helps to alleviate some of this burden. The U.S. Department of Energy (DOE) has found that weatherization creates an annual average energy savings of $350.

Weatherization often involves comprehensive tests to assess the safety and functionality of heating units and household appliances. These tests evaluate combustion safety, identify potential gas leaks, and inspect for moisture damage to safeguard against health hazards such as mold growth.

Additionally, weatherization efforts entail ensuring the safety of electrical systems within homes to prevent electrical hazards. Part of this process involves the

[18] https://www1.eere.energy.gov/wip/pdfs/wap_factsheet.pdf

installation of essential safety devices like smoke detectors and carbon monoxide detectors to provide early warnings of potential threats to occupants.

The U.S. DOE indicates that for every $1 invested, weatherization returns $2.73 in energy and non-energy related benefits.

Community Concerns

This measure was added after the community public outreach meeting. When asked what was missing from the list of priority measures, "energy efficiency" was a common theme in feedback responses.

Quantified GHG Reduction Measures

The U.S. DOE estimates that weatherization measures reduce energy emissions by one metric ton per home annually.[19] The total reduction associated with this measure is variable and depends on the number of homes completed. See Appendix C for potential reductions through 2030 and 2050 based on a set of assumptions.

Authority to Implement

The LFUCG Division of Environmental Services will facilitate the program. This measure will be implemented with existing authority through existing powers of local governments. Budget authority and dedicated funds may need to be respectively increased or created through statute. Memoranda of Agreements will be executed with partnering agencies outlining specific scopes and responsibilities.

Implementation Schedule

The Lexington-Fayette MSA will implement the program for the next five years. An estimated timeline for a typical year is shown below:

[19] https://www1.eere.energy.gov/wip/pdfs/wap_factsheet.pdf

PRIORITY MEASURES

Project Milestone	Date
RFP Released	December 21
Notice of Intent Due	January 16
RFP Question and Answer (Q&A) Session	January 19
RFP Written Question Due in Ionwave	January 23
Deadline to Submit RFP Proposal	January 25
Interviews (if needed)	February 1- 2
Selected Contractor(s) Announced	February 5
Council Approval & Selected Contractor(s) Onboarding	February 5 - March 4
Enrollment & Contracts Begin	March 12
Customer Enrollment Period Ends	August 9
Customer Contract Signing Deadline	September 27
Completion Deadline	December 31

LEXTRAN ELECTRIC VEHICLE SHELTER & CHARGING INFRASTRUCTURE

OVERVIEW

Lextran is Lexington's public transportation system. It employs over two hundred people and operates a dynamic fleet of over sixty-five vehicles. This fleet includes compressed natural gas, battery-electric, hybrid-electric, and diesel buses.

Collectively, Lextran's fixed-route network serves roughly 900 stops across 225 route miles using a peak weekday fleet of 52 buses. Regular bus fare is $1.00, and there are a variety of reduced fares and pass programs available to individuals who qualify. All buses are equipped with bike racks and are wheelchair accessible.

Lextran focuses organization efforts around three key pillars:

1. Deliver a high-quality product and service.
2. Demonstrate value to the community.
3. Manage and sustain resources.

Current Status of Measure

A canopy project has been designed to protect Lextran's existing electric vehicles and allow them to further incorporate electric vehicles into their fleet. The canopy will be constructed at Lextran's current maintenance facility at 220 West Loudon Avenue in Lexington, Kentucky. The canopy will incorporate the appropriate conduit and concrete work to create space to install electric bus charging equipment. To ensure that the electric vehicles can charge during a power outage or other utility disruption, the canopy site work will include the appropriate infrastructure to add a new generator as well.

The canopy furthers Lextran's commitment to providing environmentally-friendly transit service with green elements such as a rainwater collection system and LED lighting. The canopy will also be designed to support solar panels that will generate electricity to offset usage by the buildings on the property.

Geographic Scope

While this project is located in Fayette County, the entire region will reap the benefits of reduced transportation emissions.

LIDAC Benefits Analysis

The canopy construction, and operation after construction, will not negatively impact the surrounding community. The canopy will not require Lextran to acquire new property. It will be constructed at Lextran's current maintenance facility. There will be no relocation of homes, businesses, farms, or other resources for the construction or operation of the canopy.

The canopy will generate positive impacts to the surrounding community, and Fayette County as a whole. By installing the canopy, Lextran will be able to deploy more electric buses in their fleet in place of aging diesel vehicles, therefore improving air quality in the community. The surrounding community will also benefit from less

noise during Lextran's maintenance functions, as electric buses produce much less noise than combustion engine buses.

Lextran used the 2019 American Community Survey data to describe the low-income and minority populations surrounding the canopy site. While the project is located in a Census block group that has a higher proportion of low-income and minority communities than Fayette County as a whole, those populations are buffered from the canopy site by the active railroad that borders Lextran's property. There will be no additional pollution, noise, or other nuisance generated by the canopy that would affect surrounding low-income or minority populations.

Community Concerns

Feedback from the community on this measure was generally positive, but the following concerns were voiced:

- Reliability and longevity of electric buses
- Potential vandalism of structure
- Construction environmental impacts
- Cost

Quantified GHG Reduction Measures

The canopy will provide approximately 12,000 square feet of available space for solar panels. The total emissions reduced may vary based on the solar panels selected, but for every 1,000 kWh generated by the solar installation, approximately 1,739 lbs of CO2e will be avoided.

In addition, the canopy will allow for a total fleet of 29 electric vehicles. Lextran used the Federal Transit Administration's Transit Bus Electrification Tool to estimate lifecycle GHG emission savings for replacing a diesel bus with an electric bus. The tool accounts for eGRID subregion when considering the emissions generated from charging. The tool estimates that based on the average annual vehicle miles traveled (VMT) by one of Lextran's diesel buses, it produces 72 MT CO2e annually. An electric bus is estimated to produce 50% fewer emissions at about 36 MT CO2e annually. See Appendix C for potential reductions through 2030 and 2050 based on a set of assumptions.

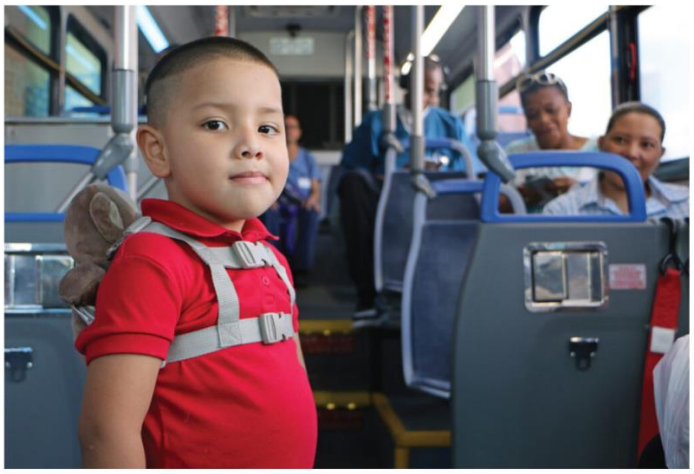
Authority to Implement

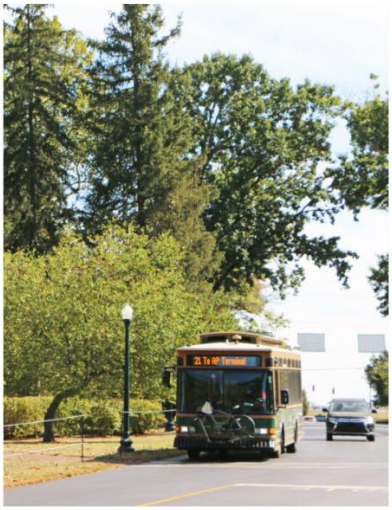
This measure will be facilitated by Lextran and the Lexington Area Metropolitan Planning Organization. This measure will be implemented with existing authority through existing powers of LFUCG and to the extent that Lextran's budget is linked to LFUCG. Budget authority and dedicated funds may need to be respectively increased or created through statute. Memoranda of Agreements will be executed with partnering agencies outlining specific scopes and responsibilities.

Implementation Schedule

This project has received a Categorical Exclusion and construction plans and specifications are being finalized. Construction will commence as soon as design is complete and funding is secured. It is estimated to be complete within five years.

PRIORITY MEASURES





REGIONAL ELECTRIC VEHICLE CHARGING NEED STUDY

OVERVIEW

Vehicles, including cars, trucks, buses, and motorcycles, emit pollutants directly into the air through combustion engines. The production, refining, and transportation of fossil fuels further exacerbate air pollution and climate change. These pollutants, such as carbon monoxide, nitrogen oxides, volatile organic compounds, and particulate matter, degrade air quality and pose health risks to humans.

Additionally, transportation is a major source of GHG emissions, primarily carbon dioxide, which contributes to climate change. Transportation-related emissions accounted for the largest portion (29%) of total U.S. GHG emissions in the last *Inventory of U.S. Greenhouse Gas Emissions and Sinks* report. To address transportation-related air pollution, policies promoting cleaner transportation modes, such as electric vehicles, public transit, biking, walking, and carpooling, along with improvements in fuel efficiency standards and alternative fuels, are crucial for mitigating air pollution and protecting public health.

Current Status of Measure

The Biden-Harris administration has set a target for electric vehicles (EVs) to comprise 50% of vehicle sales by 2030.[20] The National Electric Vehicle Infrastructure (NEVI) Program was created under the Bipartisan Infrastructure Law of 2021. The NEVI Program is intended to facilitate the buildout of a national EV charging network with EV chargers located no more than 50 miles apart on designated Alternative Fuel Corridors. These corridors generally track with the U.S. interstate highway system and will ensure long-distance drivers have reliable access to EV charging stations.

While this is a momentous move in the right direction, there will still be gaps to fill to ensure reliable access to EV chargers. This measure involves conducting a study to identify the remaining need in the Lexington-Fayette MSA. The study will have three primary goals: support long-distance travel by EVs, identify areas where the private sector is less likely to provide recharging infrastructure with a focus on LIDACs, and identify the feasibility of hydrogen refueling to support freight logistics and heavy construction vehicles.

The U.S. DOE's Alternative Fuels Data Center maintains a map of EV charging station locations. The following table shows the current number of public charging stations in each municipality in the MSA.

Table 4-2 – Public Electric Vehicle Charging Locations

Municipality	# of Public Charging Locations
Paris	0
Winchester	2
Lexington-Fayette	21
Nicholasville	1
Wilmore	1
Georgetown	5
Versailles	2

[20] https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/13/fact-sheet-the-biden-harris-electric-vehicle-charging-action-plan/

Geographic Scope

The Lexington Area Metropolitan Planning Organization will lead the study and will evaluate all counties in the MSA.

LIDAC Benefits Analysis

This study will focus on identifying EV charging station deserts to ensure equitable access in all communities.

In rural regions of the MSA, EVs present a particularly appealing alternative to traditional vehicles. Rural residents tend to drive more than their urban counterparts, incur higher expenses on vehicle fuel and maintenance, and frequently have limited alternatives to driving for fulfilling their transportation requirements. Embracing EVs in these areas offers the potential for residents to diminish such costs over time while also mitigating the environmental footprint of transportation within their communities.

Community Concerns

Feedback from the community on this measure was generally positive, but the following concerns were voiced:

- Potential vandalism of charging stations
- Reliability of charging stations
- Impacts to the grid

Quantified GHG Reduction Measures

EVs are known for producing minimal or no tailpipe emissions. However, the generation of electricity used to charge EVs may still result in carbon pollution. The extent of this pollution varies significantly depending on the source of local power generation. For instance, electricity generated from coal or natural gas, which emit carbon pollution, contrasts with that produced from renewable resources such as wind or solar, which do not.

Despite these emissions from electricity generation, studies indicate that EVs typically contribute to lower levels of GHGs compared to an average new gasoline car. Moreover, the adoption of more renewable energy sources like wind and solar for electricity generation could further decrease the overall GHG emissions associated with EVs. Based on data from the U.S. DOE Alternative Fuels Data Center and Beyond Tailpipe Emissions Calculator, electric vehicles in Kentucky produce at least 50% less emissions than gasoline vehicles. Increased confidence in charging availability will influence consumers thinking about making the switch.

The total emissions reductions for this measure are highly variable and depend on the total increase in electric vehicle ownership. See Appendix C for potential reductions through 2030 and 2050 based on a set of assumptions.

Authority to Implement

This measure will be facilitated by the Lexington Area Metropolitan Planning Organization. This measure will be implemented with existing authority through existing powers of local governments. Budget authority and dedicated funds may need to be respectively increased or created through statute.

Implementation Schedule

This project will be bid through the LFUCG procurement process. It is estimated that a contract will be awarded within six months. Once a consultant is selected, the study is estimated to be completed within a year.

PRIORITY MEASURES

Coordination and Outreach

In 2012, a group of stakeholders developed Lexington's first sustainability plan. The Empower Lexington Plan was described as the first steps in the city's efforts to become a more energy aware, energy efficient, sustainable community. LFUCG hired its first sustainability manager in 2022 to lead a coordinated, long-term, holistic effort related to sustainability. The sustainability manager's first charge was to collaborate with stakeholders to update the original Empower Lexington Plan.

Lexington was also selected for the 2023 national cohort of the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) for Cities program. LEED for Cities "helps local leaders create and operationalize responsible, sustainable and specific plans for natural systems, energy, water, waste, transportation and many other factors that contribute to quality of life—revolutionizing the way cities and communities are planned, developed and operated to improve their overall sustainability and quality of life."[21]

LFUCG conducted a series of in-person and virtual public meetings, as well as a community-wide survey, to receive input from the community on what should be included in the plan. The updated plan is intended to address the themes of LEED for Cities including Natural Systems and Ecology, Transportation and Land Use, Water Efficiency, Energy and Greenhouse Gas Emissions, Materials and Resources, and Quality of Life.

Many of the recommendations echo the priority measures included in this plan, shown below:

Natural Systems and Ecology

- Preserve land with vegetative and tree cover, in both rural and urban areas.
- Promote practices and policies that maintain vegetation, sequester carbon dioxide, preserve soil, and reduce surface water runoff for agricultural, residential, and commercial lands.

[21] https://www.usgbc.org/leed/rating-systems/leed-for-cities-communities

Transportation and Land Use

- Encourage the transition of large vehicle fleets to EV and alternative fuels.
- Assess EV and alternative fuel needs in Lexington. Develop an action plan to address any deficiencies.

Water Efficiency

- Increase tree canopy coverage to improve water quality and reduce rainwater runoff.

Energy and Greenhouse Gas Emissions

- Set community-wide renewable energy goals as a percent of total energy used (5 years, 10 years).

Quality of Life

- Enhance opportunities for robust public outreach and engagement, particularly for issues that affect quality of life.

Documentation supporting this effort and the full list of recommendations for each theme are included in Appendix D.

The Lexington-Fayette MSA did not receive CPRG funding until December 2023. Therefore, the timeline for public outreach and coordination activities specific to the PCAP was condensed. To reach the maximum number of community members, a hybrid in-person/virtual meeting was planned. Lexington provided materials for the meeting to each participating community including a draft press release and social media posts that could be modified, as well as a facilitator guide. Attendees were provided the option to attend the presentation virtually on Zoom or in-person at the following locations:

- Lexington (Fayette County) – Senior Center, 195 Life Lane
- Paris (Bourbon County) – Library, 701 High Street
- Winchester (Clark County) – City Hall Commission Chambers, 32 Wall Street
- Nicholasville (Jessamine County) – Police Station, 717 North Main Street

After the presentation, each hub engaged in discussion regarding the proposed priority measures including concerns and questions, community perceptions, and the logistics of each measure. Participants were also given the opportunity to identify additional projects and stakeholders not currently identified who should be considered as work on the CCAP moves forward.

The meeting recording and presentation slides were posted to https://www.lexingtonky.gov/sustainability (where they are still available for review), along with a survey for residents who wished to provide feedback but were unable to attend the meeting. Overall, approximately 40 residents participated in the live public meeting and 88 provided feedback in the survey. Additional documentation including a press release, social media posts, and materials provided to partner communities are included in Appendix D.

Conclusion

This PCAP is the first major deliverable under the CPRG Planning Grant awarded to the Lexington-Fayette MSA. LFUCG and its partners will continue planning, engagement, and action to reduce emissions; invest in sustainable infrastructure, technologies, and practices; build our economy; and enhance the quality of life in Central Kentucky.

In 2025, LFUCG will publish a CCAP that establishes equitable and sustainable economic development strategies that reduce emissions across all sectors. The CCAP will include near- and long-term emissions projections, a suite of emission reduction measures, a robust analysis of measure benefits, plans to leverage federal funding, and a workforce planning analysis.

In 2027, LFUCG will publish a status report that details implementation progress for measures included in the PCAP and CCAP, any relevant updates to PCAP and CCAP analyses, and next steps and future budget and staffing needs to continue implementation of CCAP measures.

If you have questions about this PCAP or suggestions for the upcoming CCAP and Status Report, contact LFUCG at livegreen@lexingtonky.gov.

Appendix A –
Final Quality Assurance Project Plan

Climate Pollution Reduction Grants Program:

Lexington-Fayette Co. MSA

Quality Assurance Project Plan, Rev. 1

United States Environmental Protection Agency

Office of Air and Radiation

Date Approved: *1/23/2024*

1. Project Management (Group A)

1.1. Title and Approval Page

Quality Assurance Project Plan (QAPP) for
Environmental Information Submitted to Local Leaders for Approval
in the Greenhouse Gas (GHG) Inventory and Options Identification Phase
of the Climate Pollution Reduction Grants (CPRG) Program

Grant# 02D55923

Prepared by:
Tetra Tech
424 Lewis Hargett Circle, Suite 110
Lexington, KY 40503

On behalf of:
Lexington-Fayette Urban Country Government
200 E. Main Street
Lexington, KY 40507

Prepared for:
US EPA Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street SW
Atlanta, GA 30303-8960

1/22/2024

APPROVALS:

Jada Walker Griggs, Sustainability Program Manager Senior	Date: 1-22-2024
Christopher Evilia, Transportation Planning Manager	Date: 1/22/24
US EPA Region 4 Grants Project Officer:	Date: 1/23/2024
Maya Odeh-Adimah	
US EPA Region 4 Quality Assurance Manager:	Date: 1/23/2024
Daniel Garver	

QAPP Revision History

Revision No.	Description	Author	Date
0	Original Version	Tetra Tech	01/08/2024
1	Review from EPA	Tetra Tech	01/22/2024

1.2. Table of Contents

List of Tables

List of Exhibits

Abbreviations

CAA	Clean Air Act
CFR	Code of Federal Regulations
CCAP	Comprehensive Climate Action Plan
CPRG	Climate Pollution Reduction Grant
EPA	U.S. Environmental Protection Agency
GHG	Greenhouse Gas
GHGRP	Greenhouse Gas Reporting Program (40 CFR Part 98)
ICR	Information Collection Request
LFUCG	Lexington-Fayette Urban County Government
LGGIT	Community - GHG Inventory Tool (provided by the EPA)
MSA	Metropolitan Statistical Area
NEI	EPA's National Emissions Inventory
OAR	EPA Office of Air and Radiation
PCAP	Priority Climate Action Plan
PM	Project Manager
PO	EPA Project Officer for Grant
POP	Period of Performance
POR	EPA Project Officer's Representative
PWP	Project Work Plan
QA	Quality Assurance

QAM	Quality Assurance Manager
QAMD	Quality Assurance Manager Delegate
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCC	Quality Control Coordinator
TL	Task Leader

1.3. Distribution List

This section presents the primary staff who will be working on the project. These staff will be identifying existing[1] data resources for evaluation and potential use under the project or serving in project-specific roles for implementing the Quality Assurance Project Plan (QAPP). The listing in **Table 1.1** includes staff responsible for implementing independent internal quality management steps and staff serving in external oversight roles.

This QAPP and, as applicable, all major deliverables relying on existing data will be distributed to the staff presented in **Table 1.1.** Additionally, this QAPP will be provided to any unlisted staff who are assigned to perform work under this project. A secured copy of this QAPP will be maintained in the project files under *"P:\11681\213-11681-24001\Deliverables\Final QAPP"*.

Table 1.1 QAPP Distribution List

Name	Organization	Role
Maya Odeh-Adimah odehadimah.maya@epa.gov	US EPA, Region 4	EPA Project Officer (PO)
Daniel Garver garver.daniel@epa.gov	US EPA, Region 4	EPA Quality Assurance Manager
Jennifer Carey jcarey@lexingtonky.gov 859.425.2888	LFUCG	Director, Division of Environmental Services
Jada Walker Griggs jgriggs@lexingtonky.gov 859.258.3144	LFUCG	Project Manager
Abby Terry abby.terry@tetratech.com 859.514.8819	Tetra Tech	Tasks 1 - 5 Leader
Christopher Evilia cevilia@lexingtonky.gov 859.258.3167	LFUCG	Grantee Quality Assurance Manager
Chrissie Balding cbalding@lexingtonky.gov 859.425.2343	LFUCG	Grantee Quality Control Coordinator

1.4. Project/Task Organization

The Lexington-Fayette County metropolitan area is the 109th largest metropolitan statistical area (MSA) in the United States and is comprised of the six-county area of Bourbon, Clark, Fayette, Jessamine, Scott, and Woodford counties. As the largest municipality in the MSA, the Lexington-Fayette

[1] The term "existing data" is defined by the EPA's *Environmental Information Quality Policy* (CIO 2105.3) as "… data that have been collected, derived, stored, or reported in the past or by other parties (for a different purpose and/or using different methods and quality criteria). Sometimes referred to as data from other sources." The term "secondary data" may also be used to describe "existing data" in historical EPA quality-related documents.

Urban County Government (LFUCG) is designated as the lead agency to oversee and be responsible for the management of the grant funds, activities, and deliverables.

The primary personnel responsible for implementation of this project are the Project Manager (PM), Quality Assurance Manager (QAM), and Task Leader (TL). Their duties are outlined briefly in this section. The project QAM is independent of the unit generating the data.

Ms. Jada Walker Griggs is the Lexington-Fayette MSA PM and will provide senior-level oversight as needed. The PM is responsible for the Lexington-Fayette MSA's technical and financial performance as well as maintaining communications with the EPA to ensure mutual understanding of grant requirements, EPA expectations, and conformity with EPA quality procedures; managing oversight and conduct of project activities including allocation of resources to specific tasks; ensuring that quality procedures are incorporated into all aspects of the project; developing, conducting, and/or overseeing QA plans as necessary; ensuring that any corrective actions are implemented; operating project activities within the documented and approved Quality Assurance Project Plan; and ensuring that all products delivered to the EPA are of specified type, quantity, and quality.

The Lexington-Fayette MSA PM will assign the TL each technical task with instructions to complete a baseline emissions inventory for the sector(s) under the task, to develop options for potential emissions reductions with estimated reductions per option, and to develop uncertainty estimates for each reduction estimate. **Table 1.1** includes the TL. The TL is responsible for the day-to-day technical activities including planning, reporting, and controlling of technical and financial resources allocated to the task by the PM. Accordingly, the TL is primarily responsible for implementing the Quality Program and this QAPP on task-level assignments.

Task-level management system. For each of the major deliverables under each task, the TL will review all QA-related plans and reports and is responsible for transmitting them to the QA Manager (or delegate) for review and approval. The TL is responsible for ensuring that quality procedures are implemented at the task level and for maintaining the official, approved, task-level QAPP content. The TL will discuss any concerns about quality or any proposed revisions to task-level QAPP content with the QA Manager (or delegate) to identify, resolve, or preclude problems or to amend task-level plans, if necessary. In addition, the TL will work with the PM and the QA Manager to identify and implement quality improvements. The PM is responsible for ensuring the consistency of similar or related QA measures across tasks, and the TL is responsible for overseeing task-level work performed by technical staff and providing assurance that all required QA/QC procedures are being implemented.

Project-level management system. Tasks are expected to proceed concurrently, in parallel. The PM will maintain close communications with the TL and ensure any difficulties encountered or proposed changes at the task level are reviewed for implications on other similar or related tasks. The PM is also responsible for communicating progress or difficulties encountered (across all tasks) to the EPA PO or POR, who provides the EPA's primary oversight function for this project at EPA OAR/ Region 4 and is responsible for review and approval of this QAPP and any future revisions. The PM (with support from the TL and assigned technical staff) will be responsible for consulting with the EPA PO or POR, on planning, scheduling, and implementing the QA/QC for all project deliverables and obtaining required EPA approvals.

The QA Manager, Christopher Evilia, is responsible for overseeing the quality system, monitoring and facilitating QA activities on tasks, and generally helping the PM and TL understand and comply with EPA QA requirements. The QA Manager is employed by LFUCG's Division of Planning, which is in a separate office from LFUCG's Division of Environmental Services. At the request of the Lexington-Fayette MSA PM, Mr. Evilia is responsible for conducting periodic independent audits of this

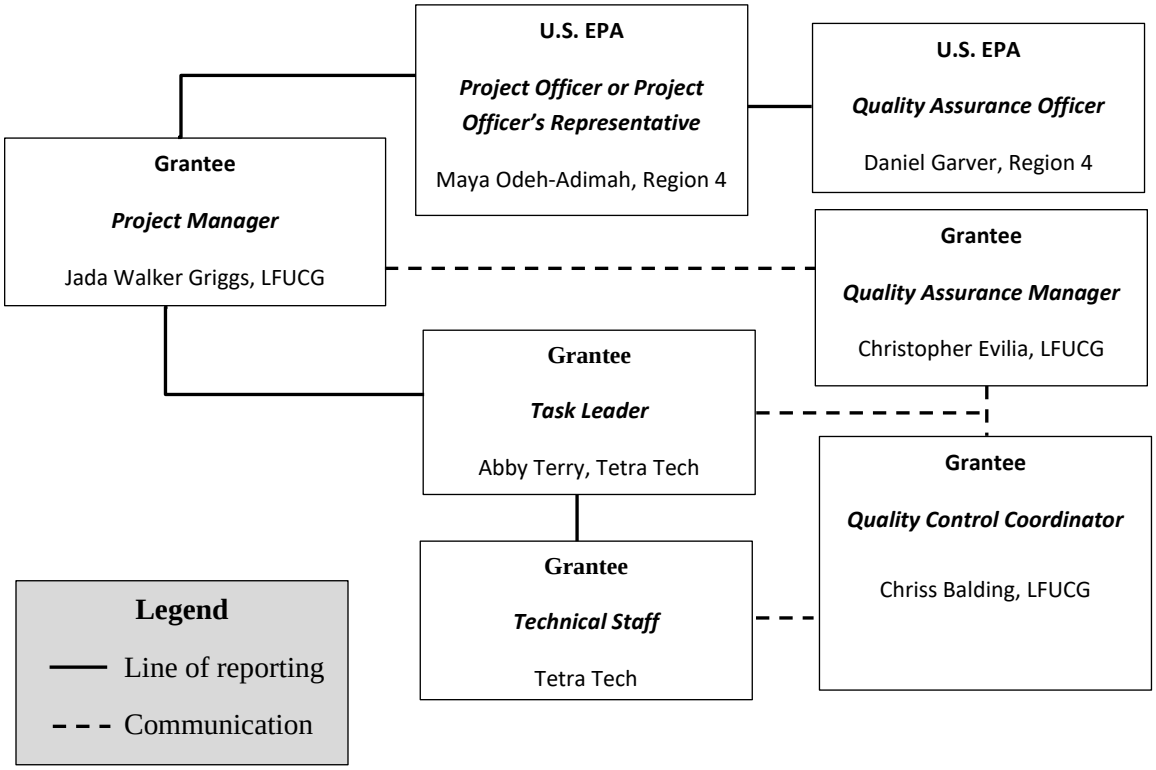
project's QA program, Mr. Evilia will produce written documentation of the audit results and recommendations.

For each task under this project, the QAM is supported by the QC Coordinator, who will assist in the implementation of the quality system. The QAM will work closely with the PM and QC Coordinator to improve any deficiencies noted during audits.

The QC Coordinator, Ms. Balding, is responsible for assisting the PM and TL in planning, documenting, and implementing the QA requirements for this project. Working with the PM, and in consultation with the QAM, she will ensure that process- and project-specific QA documents are developed; that required or recommended protocols are followed; that data are reduced, validated, and reported according to specific criteria; and that QC assessments are performed. The QC Coordinator will communicate with the PM and the QAM, as needed, on quality issues.

In addition, QC functions will be carried out by other technical staff and will be carefully monitored by the PM, who will work with the QA Manager to oversee this plan and implement quality improvements. For work done under this project, technical staff may include persons with expertise in the local residential, commercial, and industrial activities. Technical staff may also include persons with expertise in air pollution engineering, technical reviewers, database specialists, quality auditors, and technical editors. The PM will ensure that technical staff do not review work in a QA capacity for which they were a primary or contributing author. **Exhibit 1** presents the organizational chart for the project.

Exhibit 1. Project Organization[2]



[2] Under the EPA's QAPP standard (CIO 2105-S-02.0, section 3) the organization chart must also identify any contractor relationships relevant to environmental data operations.

1.5. Problem Definition / Background

Under this project, LFUCG will identify, evaluate, and utilize existing data resources[3] to develop a local inventory of the major sources of greenhouse gas (GHG) emissions within the Lexington-Fayette MSA and use that inventory data to develop a climate action plan. This QAPP focuses on the handling of environmental information under sector-specific tasks by technical staff charged with completing the following subtasks in a future planning project implemented in accordance with this QAPP:

1. Develop a comprehensive GHG inventory for the largest sources within each sector,
2. Develop options for reducing emissions within each sector,
3. Develop estimates or ranges of estimates for reductions achievable under each option,
4. Develop uncertainty analyses for each option's emissions reduction estimate, and
5. Present these analyses and options in technical reports consistent with the deliverables required under the CPRG planning grants.

The GHG inventory may utilize the EPA's Local – GHG Inventory Tool (LGGIT),[4] facility-specific GHG data published by the EPA in the Facility Level Information on Greenhouse gases Tool (FLIGHT),[5] data reported to the EPA's Greenhouse Gas Reporting Program (GHGRP),[6] EPA's National Emissions Inventory (NEI),[7] DOE's State and Local Planning for Energy (SLOPE) Platform,[8] the Global Protocol for Community-Scale (GPC) Greenhouse Gas Inventories,[9] the Local Government Operations (LGO) Protocol,[10] and/or 3rd party data or tools, together with any independent, sector-specific estimates prepared by the Lexington-Fayette MSA. The FLIGHT and GHGRP datasets can be downloaded and filtered by state, city, county, and/or zip code. Any independent local or MSA estimates or ratios (e.g., electricity usage per customer-by-customer class) will be compared to corresponding federal, state, or local estimates for validation, as available. Significant differences between primary estimates and validation estimates will be evaluated and discussed in the inventory report with the underlying data and methodologies used for the estimates. As applicable, the local inventory will include the following sources and gases (divided into the Residential, Commercial/Institutional, Industrial, and Energy Generation sectors):

LGGIT Source Categories	***Greenhouse Gases (across all sectors)***
1. Mobile Combustion 2. Stationary Combustion 3. Electricity Consumption 4. Solid Waste 5. Urban Forestry 6. Agriculture & Land Management 7. Water Use 8. Waste Generation 9. Wastewater Treatment	carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), fluorinated gases (F-gases) including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6)

[3] EPA, *Environmental Information Quality Policy*, CIO 2105.3, 03/07/2023 (p. 8) provides common examples of environmental information used to support the EPA's mission at https://www.epa.gov/system/files/documents/2023-04/environmental_information_quality_policy.pdf.

[4] https://www.epa.gov/statelocalenergy/local-greenhouse-gas-inventory-tool

[5] Facility Level Information on Greenhouse gases Tool (FLIGHT) at https://ghgdata.epa.gov/

[6] https://www.epa.gov/ghgreporting/data-sets

[7] https://www.epa.gov/air-emissions-inventories/national-emissions-inventory-ne

[8] https://www.energy.gov/scep/slsc/state-and-local-planning-energy-slope-platform

[9] https://ghgprotocol.org/ghg-protocol-cities

[10] https://ww2.arb.ca.gov/sites/default/files/classic/cc/protocols/lgo_protocol_v1_1_2010-05-03.pdf

The EPA LGGIT has two modules: the Local Government Operations Module is specific to municipal governments and evaluating GHG emissions by their departments, and the Community Module, which could also include local government information. The LGGIT User Guides state the two modules are companion tools, and any totals estimated in the Government Operations Module can be included in the Community Module. For example, a county could use the Community Module and incorporate data from the Government Operations Modules completed by the cities within the county. Grantees using both modules should conduct a quality check to ensure that emissions do not get double-counted. This template is based on the Community Module.

1.5.1. Rationale for Selection of Sectors

For each sector included in the local inventory, **Table 1.2** briefly describes why the sector was included in the inventory and the relative significance of the sector in terms of the magnitude of air emissions from existing inventories, the associated geographic distribution of the sources, and recent trends in readily available activity data for the source category.

Table 1.2 Rationale for Sector Selection

Sectors Included in Inventory	**Rationale for Including in GHG Inventory**
Mobile combustion	Transportation activities were the largest source (29 percent) of total U.S. greenhouse gas emissions in 2021. From 1990 to 2021, transportation CO_2 emissions from fossil fuel combustion increased by 19 percent. Transportation activities occur in all communities.
Electricity consumption	The electric power sector accounted for 25 percent of total U.S. greenhouse gas emissions in 2021. Power generation and/or consumption occurs among all communities.
Urban forestry[11]	This sector includes fluxes of carbon from activities such as converting forests to agricultural use and practices that remove CO_2 from the atmosphere and store it in long-term carbon sinks like forests. In 2021, the net CO_2 removed from the atmosphere by natural and working lands was 12% of total U.S. greenhouse gas emissions. Between 1990 and 2021, total carbon sequestration in this sector decreased by 14%, primarily due to a decrease in the rate of net carbon accumulation in forests, as well as an increase in CO_2 emissions from urbanization.
Agriculture & land management	Agriculture accounted for about 10 percent of U.S. greenhouse gas emissions in 2021, and agricultural soil management was the largest source of N_2O emissions. Enteric fermentation was the largest source of CH_4 emissions.
Stationary combustion (including for commercial and residential heating)	In 2021, the commercial and residential sectors accounted for 7 and 6 percent of total U.S. greenhouse gas emissions, respectively. Emissions from the commercial and residential sectors have increased since 1990. Total residential and commercial greenhouse gas emissions, including direct and indirect emissions, in 2021 have increased by 2% since 1990. In 2021, an increase in heating degree days (0.5 percent) increased energy demand for heating in the residential and commercial sectors, however, a 1.8 percent decrease in cooling degree days compared to 2020 reduced demand for air conditioning in the residential and commercial sectors.

[11] Under international GHG inventory protocols this category is called “Land use, land-use change, and forestry.”

Solid waste and waste generation	This sector includes landfills, composting, and anaerobic digestion. Landfills were the third largest source of anthropogenic methane emissions in 2021, and landfills accounted for 1.9 percent of total U.S. greenhouse gas emissions.
Wastewater treatment	Wastewater treatment, both domestic and industrial, was the third largest anthropogenic source of N_2O emissions in 2021, accounting for 5.2 percent of national N_2O emissions and 0.3 percent of total U.S. greenhouse gas emissions. Emissions from wastewater treatment increased by 6.1 MMT CO_2e (41.6 percent) since 1990 as a result of growing U.S. population and protein consumption.
Water	This sector includes indirect emissions associated with the electricity used to deliver water to local communities.

1.5.2. Decisions to be Made

The EPA's recommended tool for local GHG inventories (the LGGIT) covers categories of GHG emissions by source category (e.g., mobile combustion, stationary combustion, electricity consumption, solid waste, etc.). The LGGIT provides many default values to facilitate developing local estimates using methods consistent with the Global Protocol for Community-Scale GHG Emissions.[12] There are four primary decisions to be made under each task of this project for each source category, and the Task Leader will be charged with the following decisions:

1. Determine (for each major activity) if the LGGIT estimate, a different federal estimate or tool, or a non-federal estimate should be used for the local GHG baseline estimate.
2. Determine the best options for reducing emissions of air pollution and achieving the following Congressional objectives under the Inflation Reduction Act:
    a. Reduce climate pollution while supporting creation of good jobs and lowering energy costs for families.
    b. Accelerate work addressing environmental injustice and empowering community driven solutions in overburdened neighborhoods.
    c. Deliver cleaner air by reducing harmful air pollution in places where people live, work, play, and go to school.
3. Develop an estimate or a range of estimates for reductions achievable under each option.
4. Estimate the uncertainty of the emissions reduction estimate(s) or ranges under each option.

1.5.3. Actions to be Taken, Action Limits, and Expected Outcomes

Initially, local estimates will be derived using the LGGIT tool for each source category. Subsequently, the community may elect to supplement estimates derived using the LGGIT with estimates for each source category from existing local inventories, existing local activity data, or from other EPA or state resources. Calculated estimates derived from local activity data will be compared to federal datasets and/or downscaled state estimates for validation. The rationale for including any emissions estimates that show significant discrepancies from state or federal estimates will be documented in the community's GHG inventory report along with the underlying data and calculation methodology.

[12] https://ghgprotocol.org/sites/default/files/standards/GPC_Full_MASTER_RW_v7.pdf

1.5.4. Reason for Project

The baseline GHG inventory and options analyses developed under this local community project will be utilized by the Lexington-Fayette MSA for planning purposes to support development of the following three CPRG planning deliverables:

- Lexington-Fayette MSA's **Priority Climate Action Plan** (PCAP), which is due March 1, 2024. This plan will include near-term, implementation-ready, priority GHG reduction measures and is a prerequisite for any implementation grant.
- Lexington-Fayette MSA's **Comprehensive Climate Action Plan** (CCAP), which is due in 2025 (later for tribes and territories). This plan will review all sectors that are significant GHG sources or sinks, and include both near- and long-term GHG emission reduction goals and strategies.
- Lexington-Fayette MSA's **Status Report** on progress towards goal, which is due in 2027 (not applicable to tribes or territories). This progress report will include updated analyses, plans, and next steps for key metrics.

This QAPP describes in detail the necessary QA and QC requirements and technical activities that will be implemented to ensure the baseline GHG inventory and the sector-specific emissions reduction options are reliable for the PCAP and CCAP. As necessary, revisions to the QA and QC requirements defined in this QAPP will be updated in the 2027 Status Report.

1.5.5. Relevant Clean Air Act Mandates and Authorizations

The inventory produced under this project will support the deliverables required under EPA's Climate Pollution Reduction Planning Grants. The inventory will be used to evaluate opportunities for reducing GHG emissions from all major-emitting sources including both mobile source categories and stationary source categories. This project will include the fundamental research necessary to evaluate and plan new programs (and amendments to existing Clean Air Act [CAA] programs) for reducing emissions from fossil fuel combustion activities. Many activities in the GHG inventory (and subsequent emissions reductions options analyses) include major sources of criteria and toxic pollutants. Accordingly, the purpose of this project (to evaluate and plan for reductions in GHG emissions, including reductions from usage or production of fossil fuels) is also consistent with the following statutory mandates and authorizations under Clean Air Act Title I:

- ***§ 7403. Research, investigation, training, and other activities***
  (a) Research and development program for prevention and control of air pollution
  The Administrator shall establish a national research and development program for the prevention and control of air pollution ….
    (1) conduct, and promote the coordination and acceleration of, research, investigations … and studies related to the causes … extent, prevention, and control of air pollution;
    (2) encourage, cooperate with, and render technical services and provide financial assistance to air pollution control agencies and other appropriate public or private agencies, institutions, and organizations, and individuals in the conduct of such activities ….
  (b) Authorized activities of Administrator in establishing research and development program
  In carrying out the provisions of [paragraph (a)] the Administrator is authorized to–
    (1) collect and make available, through publications and other appropriate means, the results of and other information, including appropriate recommendations by him in connection therewith, pertaining to such research and other activities;….
    (2) make grants to air pollution control agencies … for purposes … in subsection (a)(1) ….

- ***§ 7404. Research related to fuels and vehicles***
  (a) Research programs; grants; ….
  The Administrator shall give special emphasis to research and development into new and improved methods, having industry-wide application, for the prevention and control of air pollution and control of air pollution resulting from the combustion of fuels… he shall–
  (1) conduct and accelerate research programs directed toward development of improved, cost-effective techniques for–
  (A) control of combustion byproducts of fuels, ….
  (B) improving efficiency of fuels combustion so as to decrease atmospheric emissions ….

- ***§ 7405. Grants for support of air pollution planning and control programs***
  (a) Amounts; limitations; assurances of plan development capability.
  (1)(A) The Administrator may make grants to air pollution control agencies … in an amount up to three-fifths of the cost of implementing programs for the prevention and control of air pollution …. For the purpose of this section, "implementing" means any activity related to the planning, developing, establishing, carrying out, improving, or maintaining of such programs….
  (C) With respect to any air quality control region or portion thereof for which there is an applicable implementation plan under section 7410 … grants under subparagraph (A) may be made only to air pollution control agencies which have substantial responsibilities for carrying out such applicable implementation plan.

1.5.6. Information Provided by the EPA under § 7403(b)(1)

Under authority of CAA § 7403(b)(1) the EPA has provided the following resources to ensure reliable air emissions inventories are produced to support plans for reducing emissions.

- Agency-wide Quality Program Documents
- Quality Assurance-specific Directives
  - CIO 2105.3 – Environmental Information Quality Policy, April 10, 2023
  - CIO 2105-P-01.3 – Environmental Information Quality Procedure, March 7, 2023
  - CIO 2105-S-02.0 – EPA's Environmental Information QA Project Plan (QAPP) Standard
  - EPA Regional Sites for Quality Management Plans and Guidance:
    - Region 1
    - Region 2
    - Region 3
    - Region 4
    - Region 5
    - Region 6
    - Region 7
    - Region 8
    - Region 9
    - Region 10
- QA Guidance
  - EPA QA/G-4 – *Guidance on Systematic Planning Using Data Quality Objectives Process*
  - EPA QA/G-5 – *Guidance for Quality Assurance Project Plans*

LFUCG will utilize these resources, as applicable, to ensure evaluation of existing data and utilization of those data are consistent with the EPA's relevant directives and guidance.

1.6. Project / Task Description

An example schedule of deliverables for the technical tasks (Tasks 1-5) for GHG inventory QAPPs is presented in **Tables 2.1** through **2.5.** The work to be performed under this project involves preparing a local GHG emissions inventory for the Lexington-Fayette MSA. The organization of the work is based on the use of the EPA's Local – GHG Inventory Tool (LGGIT)[13] under the following sector-specific tasks:

Task 1: Local inventory of mobile combustion GHG emissions.

Task 2: Local inventory of electric power consumption (indirect) GHG emissions.

Task 3: Local inventory of solid waste GHG emissions.

Task 4: Local inventory of GHG emissions from other sectors.

- 4.1 Stationary combustion
- 4.2 Agriculture and land management
- 4.4 Waste generation
- 4.5 Water
- 4.6 Wastewater treatment

Task 5: Local inventory of urban forestry resources.

For each sector-specific task, **Tables 2.1–2.5** provide planned activities and a schedule of deliverables for use by communities preparing GHG inventories. The EPA's LGGIT, other resources, and answers to frequently asked questions are also located on the Local GHG Inventory Tool Page Greenhouse Gas Data and Resources webpage.[14] The LGGIT User's Guides provide a summary of required data inputs for each module (Table 1 of each LGGIT User's Guide).

Table 2.1 Technical Task Descriptions for Task 1.

Tasks and Deliverables	Schedule
Task 1. Mobile Combustion (Transportation)	
1. The TL will assign staff to download the EPA's Local – GHG Inventory Tool (LGGIT) at https://www.epa.gov/statelocalenergy/local-greenhouse-gas-inventory-tool and use that tool to estimate emissions from mobile combustion sources. 2. Staff will read the [Introduction] worksheet and the [Read Me] worksheet to become familiar with the organization of the tool and the tool's terminology. Staff will become familiar with Rows 42 through 59 of the [Read Me] sheet that reflect a brief summary of the steps necessary to complete the calculations for each sector. Additionally, staff can reference the LGGIT User's Guide for the Community Module that is included within the downloaded zip file. 3. Staff will complete the four (4) initial setup steps on the [Control Sheet].	Within 7 days of QAPP approval by EPA.

[13] https://www.epa.gov/statelocalenergy/local-greenhouse-gas-inventory-tool .
[14] Ibid.

Table 2.1 Technical Task Descriptions for Task 1.

Tasks and Deliverables	**Schedule**
Task 1. Mobile Combustion (Transportation)	
4. Staff will review Chapter 7 - Transportation in the GPC GHG Emissions Inventories, and/or Chapter 7 - Vehicle Fleet in the LGO Protocol. Staff will obtain from a state or local motor vehicle agency, the most recent listing of vehicles registered at addresses located in the local community or MSA including (as available) year-manufactured, make, model, body style, fuel, and description. 5. In the LGGIT: Community Module [community_ghg_inventorytool.xlsm], staff will use the [Mobile-Entry] sheet to load the community's or MSA's population of fossil-fueled motor vehicles. Staff will prepare an aggregated listing (i.e., listing of sets of vehicles with counts by vehicle type, model, year, and fuel) for all of registered vehicles and an estimate of the average fuel consumed for each set of similar vehicles. 6. The TL will assign a staff member who did not support steps 1-5 of this task to complete a QC review. Staff will independently review the original source data for all inputs and supporting calculations used to populate the [Mobile-Detail Calcs] sheet. Staff will also complete an independent review of all inputs to the LGGIT and complete independent calculations for at least 2 types of vehicles (as directed by the PM or TL) on the [Mobile-Detail Calcs] sheet. The assigned QC staff member will also be directed to compare the LGGIT-based estimate to the estimate published in the EPA's National Emissions Inventory (NEI) and available using the *Data Queries* tool at https://www.epa.gov/air-emissions-inventories/2020-nei-supporting-data-and-summaries. This NEI query tool provides national, state, county, and tribal emissions estimates for mobile sources. 7. In the GHG inventory report or in a separate report based on the GHG inventory, LFUCG will include a listing of options for emissions reductions from this sector that may include one or more of the following components or other components (that are not listed below) that assigned staff may identify during preparation of the inventory in the future during implementation of this task: a. The specific source categories and activities affected by the proposed option. b. The quantity of GHG emissions reduced by the options with an associated uncertainty estimate. c. The quantity of criteria emissions reduced by the options with an associated uncertainty estimate. d. The quantity of toxic air pollutant emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with an associated uncertainty estimate.	.

Table 2.1 Technical Task Descriptions for Task 1.

Tasks and Deliverables	Schedule
Task 1. Mobile Combustion (Transportation)	
e. A description of any benefits that the option will impart to communities with known environmental injustice issues such as close proximity to major transportation corridors.	

Table 2.2 Technical Task Descriptions for Task 2.

Tasks and Deliverables	Schedule
Task 2. Electric Power Consumption	
1. The TL will assign a staff member to use the EPA's LGGIT tool [community_ghg_inventorytool.xlsm] and to verify that the four (4) initial steps required on the [Control Sheet] have been completed. 2. Staff will review Chapter 6.5 - Calculating Emissions from Grid-Supplied Energy Consumption in the GPC GHG Emissions Inventories, and/or Chapter 6.2 - Electricity Use in the LGO Protocol. 3. Staff will obtain total electricity consumption data for the community or MSA from one or more of the following local, state, or federal resources to be used for the baseline estimate or QC validation of the baseline estimate: a. Summaries of metered consumption obtained from the local electric utilities that serve the community or MSA by customer class. b. EIA Form 861 data published by the DOE and available at https://www.eia.gov/electricity/data/eia861/. c. The State and Local Planning for Energy (SLOPE) model datasets available at https://maps.nrel.gov/slope/about. Note these data are published as electricity usage in the units of MMBtu/year for the entire county. Estimates are provided for residential, commercial, and institutional customer classes. These data will be converted to kilowatt-hours per year prior to entry into the LGGIT tool. The projections available in this tool (for future years) may also be used for estimating emissions reductions associated with options listed for the electric utility sector. 4. Staff will use the [Electricity-Entry] sheet of the EPA's LGGIT tool. Staff will read the explanation of the *Data Entry & Calculations* starting in cell A3. Staff will enter the data for each chosen entity. These entities may be of any scale as chosen by the grantee (e.g., the entire community by sector; individual building, such as a commercial or institutional facility; or a set of similar facilities (e.g., a group of similar residential units). For groups of similar units, when entering the *Unit Description* in cell C10 of the [Electricity-Entry] sheet, staff will include in the description the number of units that were included when the *electricity purchased (kWh)* value was summed or otherwise calculated for entry into cell C16. Staff will document in the inventory each calculation with associated units of	Within 7 days of QAPP approval by EPA.

Table 2.2 Technical Task Descriptions for Task 2.

Tasks and Deliverables	Schedule
Task 2. Electric Power Consumption	

measure for each record added on the [Electricity-Entry] sheet in a manner similar to the following example:

A	B	C		D
Count of Units in Set	**Set Description**	**Avg. Annual kWh Used (per Unit)**		**Annual Usage (All Units)**
1000	Single-family home	750 kWh	=	750,000 kWh
		(Single-family home) (1 Year)		Year

Staff will document the source of the MW-hr usage per customer entered in column C.

5. Staff will determine if EIA Form 861 at https://www.eia.gov/electricity/data/eia861/ includes one of the following types of data that may be useful for estimating or validating the usage per customer entered in column C of step 2:
    a. The community's or MSA's total electricity usage.
    b. The service territory or territories that include the community or MSA. (See the EIA Form 861 file entitled [Service_Territory_2020.xlsx] for a listing of the utilities that serve each county in the United States,
    c. A service territory adjacent to the community or MSA with similar usage patterns that may be comparable to the community's or MSA's estimate, or
    d. Make a determination that there are no data under EIA Form 861 that are relevant to estimating or validating local usage per customer in column C of step 2.
6. If the community locates EIA 861 electricity data relevant to estimating or validating local usage, staff will include in the inventory the following values from EIA Form 861 to reflect electricity usage per customer most similar to local usage:

EIA 861 Column Name	EIA Form 861 Value
Year of Data	
Utility Name	
Utility Number	
State	
BA Code	
Residential Sales (MW-hrs)	
Residential Customers	
Commercial Sales (MW-hrs)	
Commercial Customers	
Industrial Sales (MW-hrs)	

Table 2.2 Technical Task Descriptions for Task 2.

Tasks and Deliverables	Schedule
Task 2. Electric Power Consumption	
<table><tr><td>Industrial Customers</td><td></td></tr><tr><td>Transportation Sales (MW-hrs)</td><td></td></tr><tr><td>Transportation Customers</td><td></td></tr></table> 7. In the GHG inventory report or in a separate report based on the GHG inventory, include a listing of options for emissions reductions from this sector that includes the following components: a. The specific source categories and activities affected by the proposed option. b. Quantity of GHG emissions reduced by the options with an associated uncertainty estimate. c. Quantity of criteria emissions reduced by the options with an associated uncertainty estimate. d. Quantity of toxic air pollutant emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. Description of any benefits that the option will impart to communities with known environmental injustice issues such as close proximity of the community to an affected source under the option that emits toxic air pollutants.	

Table 2.3 Technical Task Descriptions for Task 3.

Tasks and Deliverables	Schedule
Task 3. Solid Waste (Landfills)	
1. The TL will assign technical staff to develop estimates for this source using the LGGIT's [Solid Waste_Control] and [Solid Waste-Entry] worksheets. (The [Solid Waste-Entry] worksheet only provides locations to enter data after the [Solid Waste-Control] worksheet is populated.) 2. Staff will review Chapter 8 - Waste in the GPC GHG Emissions Inventories, and/or Chapter 9 - Solid Waste Facilities in the LGO Protocol. 3. On the LGGIT's [Solid Waste_Control] worksheet, staff will enter the total number of landfills in the community, the landfill name, whether or not the landfill has a landfill gas (LFG) collection system, and if the LFG collection system is partial or comprehensive	Within 7 days of QAPP approval by EPA.

Table 2.3 Technical Task Descriptions for Task 3.

Tasks and Deliverables	Schedule
Task 3. Solid Waste (Landfills)	
(definitions are provided). 4. On the [Solid Waste_Entry] sheet, staff will enter the following data per landfill type: a. For landfills without a LFG collection system, staff will obtain and enter the annual quantities of waste deposited into the landfill for the life of the landfill, and the opening and closing years of the landfill. The instructions then provide the option to click on a link that takes you to the LGO Protocol Landfill Emissions Tool, where this data is entered. b. For landfills with a comprehensive LFG collection system, staff will obtain and enter the annual amount of landfill gas collected. c. For landfills with a partial LFG collection system, staff will obtain and enter the annual amount of landfill gas collected and the ratio of uncollected surface area over the collected surface area. 5. In the inventory report or in a separate report based on the inventory, include a listing of options for emissions reductions from this sector that includes the following components: a. The specific source categories and activities affected by the proposed option. b. The quantity of GHG emissions reduced by the options with an associated uncertainty estimate. c. The quantity of criteria emissions reduced by the options with an associated uncertainty estimate. d. The quantity of toxic air pollutant emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. A description of any benefits that the option will impart to communities with known environmental injustice issues such as close proximity of the community to an affected source under the option that emits toxic air pollutants.	

Table 2.4 Technical Task Descriptions for Task 4.

<table>
<tr><th>Tasks and Deliverables</th><th>Schedule</th></tr>
<tr><td colspan="2">Task 4. Inventory of GHG Emissions for Other Sources</td></tr>
<tr><td>1. The TL will assign the primary technical staff member(s) to use the EPA’s LGGIT tool and the following worksheets to develop the primary estimates for other sectors.

<table><tr><th>Other Sources</th><th>LGGIT Worksheet(s)</th></tr><tr><td>Stationary combustion</td><td>[Stationary-Entry]
[Stationary-Data]
[Stationary-Calcs]</td></tr><tr><td>Agriculture & land management</td><td>[Agriculture & Land Management]</td></tr><tr><td>Water</td><td>[Water]</td></tr><tr><td>Wastewater treatment</td><td>[Wastewater-Control]
[Wastewater-Entry]
[Wastewater-Calcs]</td></tr><tr><td>Waste generation (disposal external to community’s geopolitical boundary)</td><td>[Waste Production]</td></tr></table>
2. After the primary LGGIT calculations are complete, the TL will assign a QC staff member to complete the following steps:
a. Review the original source(s) of data for all inputs to the LGGIT tool.
b. Validate that values from original source(s) were correctly entered into the primary LGGIT tool.
c. Populate a blank version of the LGGIT tool with the inputs in a QC version.
d. Compare the outputs of the primary version of the LGGIT versus the QC version of the LGGIT.
e. Compare source listing LGGIT’s [Summary-Emissions] sheet to previous inventories published by community or by neighboring or similar communities to determine if any major sources of GHGs were omitted from the inventory.
f. Document findings and submit findings to the PM, TL, and QAM for resolution.
g. Document steps taken to resolve any findings.
3. In the GHG inventory report or in a separate report based on the GHG inventory, include a listing of options for emissions reductions from this sector that includes the following components:
a. The specific source categories and activities affected by the proposed option.
b. The quantity of GHG emissions reduced by the options with an associated uncertainty estimate.
c. The quantity of criteria emissions reduced by the options with an associated</td><td>Within 7 days of QAPP approval by EPA.</td></tr>
</table>

Table 2.4 Technical Task Descriptions for Task 4.

Tasks and Deliverables	Schedule
Task 4. Inventory of GHG Emissions for Other Sources	
uncertainty estimate. d. The quantity of toxic air pollutant emissions (as defined under applicable local, state or federal rules for air toxics) reduced by the option with an associated uncertainty estimate. e. The number of people living in any nonattainment areas where the option would reduce emissions (regardless of the specific pollutant triggering nonattainment). f. A description of any benefits that the option will impart to communities with known environmental injustice issues such as close proximity of the community to an affected source under the option that emits toxic air pollutants.	

Table 2.5 Technical Task Descriptions for Task 5.

Tasks and Deliverables	Schedule
Task 5. Urban Forestry (Natural Working Lands and Forestry)	
1. The TL will assign technical staff to develop estimates for this sector using the LGGIT's [Urban_Forestry] worksheet. 2. In order to estimate the areas of land with similar percentages of tree cover, staff will use a web-based mapping application to develop a listing of tree-covered tracts of land (i.e., polygons) with the following attributes: a. Identifier describing area (e.g., Area 1 between Crooked Creek and boundary). b. Sector (residential, commercial/institutional, industrial, energy generation) c. Total area in square kilometers (km^2). d. Percentage of area with tree cover based on local estimate. 3. For each sector, staff will calculate weighted percentage tree cover using **Equation 1.** **Equation 1** for weighted percentage of tree cover for a sector: $$\frac{\sum_{i=1}^{i=30}(km^2\ of\ area\ i)(\%\ tree\ cover\ of\ area\ i)}{\sum_{i=1}^{i=30}(km^2\ i)}$$ Where: i = 1 to 30 — Designates 30 tree covered areas in a sector on local lands. km^2 of area i — The measured area (in square kilometers) of area i. % tree cover of area i — The estimated percentage of tree cover for area i.	Within 7 days of QAPP approval by EPA.

Table 2.5 Technical Task Descriptions for Task 5.

Tasks and Deliverables	Schedule
Task 5. Urban Forestry (Natural Working Lands and Forestry)	

$\sum_{i=1}^{i=30} (km^2\ i)$	The denominator is the total combined area of all 30 areas within the sector.

4. For each sector on the LGGIT's [Urban Forestry] worksheet staff will enter total area for the sector in column C rows 11 through 14 and enter weighted % tree cover in Column D.

5. For the two sectors with the largest areas of tree cover, the QAM will assign a QC staff member who did not support steps 1 through 4, to develop independent estimates and to complete the following QC steps:

    a. Review the original source(s) of data for all inputs to the primary LGGIT tool.
    b. Validate correct entry of values from original source(s) into the primary LGGIT.
    c. Populate a blank version of the LGGIT tool with the inputs in a QC version.
    d. Compare the primary outputs of the LGGIT versus the QC version of the LGGIT.
    e. Compare the listing of resources by sector on the LGGIT's [Summary-Emissions] sheet to previous inventories published by the locality or by neighboring or similar localities to identify any major discrepancies.
    f. Document findings and submit findings to the PM, TL, and QAM for resolution.
    g. Document steps taken to resolve any findings.

6. In the inventory report or in a separate report based on the inventory, include a listing of options for emissions reductions from this sector that includes the following components:
    a. Specific source categories and activities affected by the proposed option.
    b. Quantity of GHG emissions reduced by option with uncertainty estimate.
    c. Quantity of criteria emissions reduced or mitigated (such as by adsorption of PM2.5 on leaf surfaces) by the option with an associated uncertainty estimate.
    d. The number of people living in any nonattainment areas where the option would reduce emissions or improve air quality conditions by providing shade to urban heat islands (regardless of the specific pollutant triggering nonattainment).
    e. A description of any benefits that the option will impart to communities with known environmental injustice issues such as providing windbreaks to communities in close proximity to sources of nuisance dust (e.g., dirt roads used for mining operations).
    f. The number of schools, miles of roadways, or public traffic counts at major commuting destinations that would be positively affected by options that include planting of trees or other vegetation.

1.7. Quality Objectives / Criteria

The primary objectives for this project are to develop reliable inventories for each of the GHG-emitting sectors in the Lexington-Fayette MSA and to identify options for reducing emissions from those sectors. Accordingly, all quality objectives and criteria are aligned with these objectives. The quality system used for this project is the joint responsibility of the PM, Task Leader, and QA Manager. As discussed in Section 1.4, an organizationally independent QA Manager will maintain oversight of all required measures in this QAPP. QC functions will be carried out by technical staff and will be carefully monitored by the Task Leader, who will work with the QA Manager to identify and implement quality improvements. All activities under this project will conform to this QAPP.

1.7.1. Data Quality, Management, and Analyses

For this project, LFUCG will use a variety of QC techniques and criteria to ensure the quality of data and analyses. Data of known and documented quality are essential components for the success of the project, as these data will be used to inform the decision-making process for the PCAP and CCAP as discussed in Section 1.5.4. The table in **Appendix A** lists by task the specific QC techniques and criteria that are part of this QAPP.

The data quality objectives and criteria for this project are accuracy, precision, bias, completeness, representativeness, and comparability. *Accuracy* is a measure of the overall agreement of a measurement to a known value. It includes a combination of random error (precision) and systematic error (bias). *Precision* is a measure of how reproducible a measurement is or how close a calculated estimate is to the actual value. *Bias* is a systematic error in the method of measurement or calculation. If the calculated value is consistently high or consistently low, the value is said to be biased. Our goal is to ensure that information and data generated and collected are as accurate, precise, and unbiased as possible within project constraints. It is not anticipated that this project will include primary data collection. Generally, existing data and tools provided by the EPA and other qualified sources will be used for project tasks. A subject matter specialist familiar with technical reporting standards (such as a permit writer or compliance engineer with knowledge of the community's facilities operating in the sector) will be used to QA all data utilized for developing the local GHG inventory. LFUCG will verify the accuracy of all data by checking for logical consistency among datasets. All existing environmental data shall meet the applicable criteria defined in CFR and associated guidance, such as the validation templates provided in the *EPA QA Handbook Volume II*.

Uncertainty can be evaluated using a few different approaches. The most useful uncertainty analysis is quantitative and is based on statistical characteristics of the data such as the variance and bias of estimates. In a sensitivity analysis, the effect of a single variable on the resulting emissions estimate generated by a model (or calculation) is evaluated by varying its value while holding all other variables constant. Sensitivity analyses will help focus on the data that have the greatest impact on the output data. Additional statistical tests may be utilized depending on the need for more or less rigorous tools and on the specific project activity being evaluated.

When available, data originally gathered using published methods whose applicability, sensitivity, accuracy, and precision have been fully assessed, such as EPA reference methods, will be preferred and considered to be of acceptable quality. Project decisions may be adversely impacted if, for example, existing data were used in a manner inconsistent with the originator's purpose. Metadata can be described as the amount and quality of information known about one or more facets of the data or a dataset. It can be used to summarize basic information about the data (e.g., how, why, and when the existing data were collected), which can make working with specific data or datasets easier and provides the user with more confidence. Metadata are valuable when evaluating existing data, as well as when planning for collection

primary data that may be required in the future. However, the effort needed to locate and obtain original source materials can be costly. Accordingly, a graded approach to planning will be applied and ongoing discussions with the EPA will be held to determine what magnitude and rigor of QA effort are appropriate and affordable for the project.

For the data analysis completed under this project, analytical methods will be reviewed to ensure the approach is appropriate and calculations are accurate. Spreadsheets will be used to store data and complete necessary analyses. Design of spreadsheets will be configured for the intended use. All data and methodologies specific to each analysis will be defined and documented. Tables and fields will be clearly and unambiguously named. Spreadsheets will be checked to ensure algorithms call data correctly and units of measure are internally consistent. Hand-entered or electronically transferred data will be checked to ensure the data are accurately transcribed and transferred.

The draft inventory will be evaluated for GHG-emitting-sector and geographic completeness. LFUCG will utilize the framework of sectors in the EPA's LGGIT tool, previous local inventories, or previous inventories completed by similar communities to ensure that the inventory prepared under this project includes all major GHG-emitting sectors. To ensure the inventory is geographically complete, the draft inventory will also be submitted for review by LFUCG staff within the community who are familiar with all activities subject to local or federal standards issued under Title I of the CAA to ensure that all major-emitting, local activities are included in the inventory.

Representativeness is a qualitative term that expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. LFUCG will use the most complete and accurate information available to compile representative data for the community's GHG-emitting activities.

Data comparability is a qualitative term that expresses the measure of confidence that one dataset can be compared to another and can be combined for the decision(s) to be made. LFUCG will compare datasets when available from different sources to check for the quality of the data. This QA step will also ensure that any highly correlated datasets or indicators are identified. Supporting data, such as information on reference methods used and complete test reports, are important to ensure the comparability of emissions data.

1.7.2. Document Preparation

All documents produced under this project will undergo internal QC review, as well as technical review and an editorial review, prior to submission to the EPA PO. QC will be performed by an engineer, scientist, or economist, as appropriate, with sufficient knowledge. The technical reviewer will review the document for accuracy and integrity of the technical methodologies, analyses, and conclusions.

An editorial review of all final documents will be performed. Editors will verify clarity, spelling, and grammatical correctness, and ensure documents are free of typographical errors. Editors will verify that references are cited correctly. This will include a comparison against the original documents.

The *QC Documentation Form* (**Appendix B**) will be used to track the approval process. The form must be completed and signed for all document deliverables. The signatures required include those of the TL and technical and editorial reviewers. Completion of this form certifies that technical review, editorial review, and all required QC procedures have been completed to the satisfaction of the TL and QAM or QCC. Copies of these signed forms will be maintained in the project files.

1.8. Special Training / Certifications

All Lexington-Fayette MSA staff assigned to work on this project shall have appropriate technical and QA training to properly perform their assignments. LFUCG staff serving in the QAM role under this project will have completed a training course on QA/QC activities similar to the course available at https://www.epa.gov/quality/training-courses-quality-assurance-and-quality-control-activities. The PM and TL under this project will have completed an online training course on air emissions inventories on the Air Knowledge website at https://airknowledge.gov/EMIS-SI.html.

No additional technical training is required. If training is required for new staff or for particular segments of the GHG inventory, the PM in coordination with the associated TL will identify available training resources for the inventory segment and incorporate the required training into the project schedule.

1.9. Documents and Records

LFUCG will document in electronic form (and/or hard copy) QC activities for this project. The TL is responsible for ensuring that copies of all completed QC forms, along with other QA records (including this QAPP), will be maintained in the project files. Project files will be retained by LFUCG for 10 years after PCAP submittal. The types of documentation that will be prepared for this project include:

- Planning documentation (e.g., QAPP)
- Implementation documentation (i.e., Review/Approval Forms and QC records)
- Assessment documentation (i.e., audit reports and independent calculations).

Detailed documentation of QC activities for a specific task or subtask will be maintained using the *QC Documentation Form* shown in **Appendix B**. This form will document the completion of the QC techniques planned for use on this project as listed in the table in **Appendix A**. One or more completed versions of these forms, as necessary, will be maintained in the project files. The types of documents and activities for which QC will be conducted and documented may include raw data, data from other sources such as data bases or literature, data entry into the LGGIT tool, calculations necessary to transform raw data into forms required for LGGIT entry, and comparisons of primary estimates with QC estimates.

Technical reviews will be used along with other technical assessments (i.e., QC checks) and QA audits to corroborate the scientific defensibility of any data analyses. A technical review (i.e., internal senior review) is a documented critical review of a specific technical work product. It is conducted by subject matter experts who are collectively equivalent (or senior) in technical expertise to those who performed the work. Given the nature of the deliverables under this project, a technical review is an in-depth assessment of the assumptions, calculations, extrapolations, alternative interpretations, and conclusions in technical work products. Technical review of proposed methods and associated data will be documented in the *QC Documentation Form* shown in **Appendix B**. The form will include the reviewer's charge, comments, and corrective actions taken.

Additionally, LFUCG has developed and instituted document control mechanisms for the review, revision, and distribution of QAPPs. Each QAPP has a signed approval form, title page, table of contents, and an EPA-approved document control format (see header at top of the page). The distribution list for this QAPP was presented in **Table 1.1**. During the course of the project, any revision to the QAPP will be circulated to everyone on the distribution list, as well as to any additional staff supporting this project. Any revision to the QAPP will be documented in a QAPP addendum, approved by the same signatories to this QAPP, and circulated to everyone on the distribution list by the PM.

At this time, LFUCG does not know if the project will collect or handle personally identifiable information (PII) subject to the Privacy Act of 1974. However, if during the course of this project technical staff determine that PII is required to support project objectives, LFUCG will meet all requirements of the Privacy Act of 1974. **Appendix C** indicates the status of our determination regarding applicability of the Privacy Act of 1974 under this project.

2. Existing Data Acquisition and Management Protocols (Group B)

2.1. Sampling Process Design

2.1.1. Need and Intended Use of Data Used

As indicated in **Tables 2.1 – 2.5**, a wide range of data for a diverse set of GHG-emitting activities is necessary to prepare a local inventory. Existing data resource may include sector-specific or facility-specific GHG emissions estimates, emissions factors, or activity data for use with emissions factors. The experimental design for this inventory project relies on the EPA's LGGIT tool together with independent estimates prepared by LFUCG assigned QC staff. Existing data resources (including but not limited to data from previously completed inventories) will be utilized to develop GHG emissions estimates that are comparable to the LGGIT estimates. Subsequently, estimates for each source category will be compared to available federal or state data by assigned QC staff.

2.1.2. Identification of Data Sources and Acquisition

The following data sources will be evaluated for use under each task to develop estimates for the major-emitting sectors in the Lexington-Fayette MSA or for use in validation of estimates:

- Task 1:
    - Vehicle registration data from the Kentucky Transportation Cabinet (KYTC).
    - State or federal averages on vehicle miles traveled and miles per gallon from the U.S. Department of Transportation.
    - National Emissions Inventory (NEI) county-level estimates for mobile sources.
- Task 2:
    - U.S. Department of Energy's (DOE's) SLOPE Platform which reports county-level electricity usage in million British thermal units.
    - DOE's EIA Form 861 which reports sub-county-level usage in MWh and customer counts as reported by the different distribution utilities operating within each county.
    - Electricity consumption by customer class obtained directly from Kentucky Utilities (KU), Blue Grass Energy, Clark Energy, and Owen Electric Cooperative.
- Task 3:
    - Number of community landfills and information on landfill gas (LFG) collection systems, as applicable, from the Kentucky Division of Waste Management.
    - Landfill emissions data reported to the EPA's GHGRP.
- Task 4:
    - Data published by the EPA under the Greenhouse Gas Reporting Program for fossil fuel consumption by customer class from Columbia Gas of Kentucky and Delta Natural Gas Company.
    - County-level natural gas consumption data from DOE's SLOPE Platform;
    - Wastewater management data from local water utility(ies).
- Task 5:
    - Area calculations from web-based map applications.
    - Tree cover estimates from local surveys or forestry databases.

2.2. Quality Control

All data operations conducted for this project will involve existing, non-direct measurement data. All data received will be reviewed by a senior technical staff member to assess data quality and completeness before their use. In addition to reviewing and assessing the data collected, all data entered into spreadsheets and all calculations completed for analyses will be reviewed by a senior technical QC reviewer. The QC reviewer will evaluate the approach to ensure the methods are appropriate and have been applied correctly to the analysis. The QC reviewer will also confirm all data were entered correctly and that calculations are complete and accurate. Calculations will be checked by repeating each calculation, independently, and comparing the results of the two calculations. Any data entry and calculation errors will be identified and corrected. Data tables prepared for the draft and final reports will be checked against the spreadsheets used to store the data and complete the analysis.

Where calculations are required to assess the data/datasets, QC calculations will be performed using computer spreadsheets and calculators to reduce typographical or translation errors–mathematical/ statistical calculations are performed using spreadsheets or software programs with predefined formulas and functions. LFUCG will ensure that any manipulations performed on the data/dataset were done correctly. Such calculations could involve statistical checks to look for data outliers. One approach, for example, that may be used to identify outliers or unusual data points is sorting a datasheet for one or more data variables. This approach is a simple but effective way to highlight unusually high or low values. Graphing data using boxplots, histograms, and scatterplots is another method that may be used to identify gaps in the data (missing data), outliers, or unusual data points. Another approach that may be used is the use of Z-scores, which can quantify the unusualness of an observation when data follow a normal distribution. A Z-score for a particular value indicates the number of standard deviations above and below the mean that the value falls. For example, a Z-score of 2 indicates that an observation is two standard deviations above the average while a Z-score of -2 indicates the value is two standard deviations below the mean. A Z-score of zero represents a value that equals the mean. As appropriate, we will also use hypothesis tests to find outliers, or an interquartile range (IQR) to calculate boundaries for what constitutes minor and major outliers. The methods used will be driven by the scale and type of data. LFUCG will determine outlier detection methods to be used based on the initial review of the data. Identified outliers will be highlighted to the PM, TL, QAM, or delegate with options for treatment.

2.3. Non-direct Measurements for GHG Inventory and Options Identification

All data operations conducted on this project will involve existing, non-direct measurement data. All existing data received will be reviewed by a senior technical staff member to assess data quality and completeness before their use.

Consistent with the EPA's QA requirements, this QAPP describes the procedures that will be used to ensure the selection of appropriate data and information to support the goals and objectives of this project. Specific elements addressed by this QAPP include:

- Identifying the sources of existing data,
- Presenting the hierarchy for data selection,
- Describing the review process and data quality criteria,
- Discussing quality checks and procedures should errors be identified, and
- Explaining how data will be managed, analyzed, and interpreted.

Data presented in the GHG inventory will be traced to its source (e.g., database input and output). Key resources include data collected by the EPA (e.g., GHGRP data), and data from EPA-approved data sources (e.g., Department of Energy and other federal data sources). These sources may include primary

literature (i.e., peer-reviewed journal articles and reports) or databases. We may also use approved existing sources (e.g., handbooks, databases). Original sources for all information and data contained in the document will be included in a list of references with appropriate citations. When peer-reviewed literature or EPA-approved data sources cannot be used, we will document any significant limitations to the data sources used.

We will document information regarding each dataset and our rationale/selection criteria for selecting the data sources used in the inventory. The TL will be responsible for overseeing and confirming the selection of the data for the project tasks.

Table 3.1 provides a hierarchy for data quality when identifying and reviewing available sources of data and information. When evaluating data resources, efforts will be made to identify and select data sources that most closely conform to the highest ranked criteria. Data quality metrics and documentation may not be provided by each source, and as necessary, we may consult with subject matter experts from permitted facilities or trade associations operating in the Lexington-Fayette MSA to qualify data for use to meet project objectives.

Any available data quality information will be reviewed by LFUCG and project advisors to ensure that the data represent full-scale designs and commercial processes, and that they are applicable to economic and regulatory conditions in the United States. LFUCG will document data sources used and any significant limitations of utilized data or information to ensure that the data are appropriate for their intended use. An internal technical reviewer will review the approach for selecting and compiling data; the review will include examination of the data sources and the intended use of the data. The specific QC techniques used will depend on the technical activity or analysis to which they are applied. The LFUCG TL is responsible for verifying the usability of data and related information.

Table 3.1 Existing Data Quality Ranking Hierarchy

Quality Rank	**Source Type**
Highest	Federal, state, and local government agencies
Second	Consultant reports for state and local government agencies
Third	NGO studies; peer-reviewed journal articles; trade journal articles; conference proceedings
Fourth	Conference proceedings and other trade literature: non-peer-reviewed
Fifth	Individual estimates (e.g., via personal communication with vendors)

LFUCG will work with EPA to ensure that all data used for the project are appropriate for their intended use. The main criteria that will be used in the selection of the data are the vintage and quality of the data (based on peer review). The quality of the data will consider the credibility of the source, and the QA documentation provided by the data source. Senior technical staff will also evaluate the availability of alternative datasets, suitability of the selected data for the intended purpose, and agreement with LGGIT estimates.

LFUCG will use the Secondary Data Quality Ranking Hierarchy when identifying and reviewing available sources of data and information. The source types in **Table 3.1** appear in the order in which they are likely to meet the data quality criteria. For example, federal government data are more likely to be

from a credible source, thoroughly reviewed, suitable, available, and representative, and any exceptions to these data criteria are likely to be noted in the government data, providing transparency. Data from individuals are expected to be less reliable, not peer reviewed, and may not be suitable or representative of local activities.

If it is determined that data meeting the fourth (i.e., conference proceedings and other trade literature: non peer-reviewed) or fifth (i.e., individual estimates such as personal communications with vendors) level compose the best or only available data source, the TL will include in the inventory a description of these data with associated limitations for review and approval by the PM and QAM.

These measures of data quality will be used to judge if the data are acceptable for their intended use. In cases where available data do not or may not meet data quality acceptance criteria, the TL will include in the inventory a discussion for review and approval by the PM and QAM explaining how emissions estimates that relied on such data compare to LGGIT estimates.

We will also consider, for example, the age (i.e., date of the source dataset) and the representativeness of the data and will include in the inventory report for review and approval by the PM and QAM any quality concerns or uncertainties introduced with use of these data, such as data gaps or inconsistencies with other sources. Any data source utilized that is older than 10 years will specifically be flagged in the inventory report.

Representativeness will be evaluated by determining that the emissions or activity data are descriptive of conditions in the United States, that the data are current, and that the data are descriptive of similar processes within the Lexington-Fayette MSA. Any incomplete datasets will be identified, and deficiencies will be evaluated to determine if data are missing or confusing and if they meet secondary-use quality objectives.

Key screening criteria will be used to screen the sources identified. The LFUCG TL will provide oversight to the screening process to ensure sources collected are the most relevant and meet quality requirements. Available data and information from the selected sources will be compiled and relevant summary information will be extracted out of the information sources to develop the required output for each of the project tasks.

2.3.1. Criteria for Accepting Existing Data for Intended Use

The criteria for determining if the data are acceptable for use in developing the local inventory will be based on a comparison of the primary emissions estimates to independent emissions estimate produced using the EPA's LGGIT or other reliable sources of activity data. While some differences between the primary calculations and independent calculations are expected, differences of more than 25 percent must be accompanied by an explanation subject to approval by the PM and QAM prior to using the estimate in the community's inventory.

2.3.2. Criteria for Options Identification

Review of activities under each task and identification of options for emissions reductions to be considered by policymakers will be based on the following criteria:

1. Quantity of reductions in emissions of climate pollution under the option.
2. Number of jobs likely to be created by the option.
3. Environmental justice benefits of the project including the number of people living in overburdened neighborhoods that will benefit from the option.
4. Quantity of reductions in criteria and toxic air pollutants that can be achieved by option.
5. Number of people living, working, recreating, and going to school in the area(s) benefiting from the option.

2.4. Data Management

Data management procedures include file storage and file transfer. All project and data files will be stored on Tetra Tech project servers. Files will be organized and maintained by the TL in folders by project, task, and function, including a system of file labeling to ensure version control. Any files containing confidential business information will be stored on secure computers. The TL will make sure that staff are trained and adhere to the project file organization and version control labeling to ensure that files are placed in consistent locations. All files will be backed up each night to avoid loss of data. Data are stored in various formats that correspond to the software being used. As necessary, data will be transferred using various techniques, including email, File Transfer Protocol, or shared drives. Typically, records will be archived once the project is completed. Record retention times will be based on contractual and statutory requirements or will follow LFUCG practices for storing materials of up to 10 years after the end of the period of performance (POP). Multiple project staff are granted access rights to the archived file system for each project. Records may be retrieved from archived file system by the TL, PM, or other project staff with access during the records retention period. As soon as allowed by applicable regulations or the grant agreement, records will be destroyed according to LFUCG policies and procedures. For any sensitive information that is gathered under the project, LFUCG's policy is consistent with EPA–recommended methods of destruction, which include degaussing, reformatting, or secure deletion of electronic records; physical destruction of electronic media; recycling; shredding; incineration; and pulping. Should the grant specify some other manner of disposition (e.g., transfer to the client), LFUCG will comply with that directive. As noted above, LFUCG has developed a file naming convention/nomenclature for electronic file tracking and record keeping. Foremost, all files must be given a short but descriptive name. For those records and files gathered or provided to LFUCG, the filename may include the identification of "original" in its filename.

Similarly, files that have undergone a review by an independent, qualified person will include, at the end of the filename, the initials of the reviewer or the suffix "rev" (in lieu of initials) if more than one reviewer reviewed the file, along with the date reviewed and version number, as a way to track which staff person(s) reviewed the file and when. Filenames of draft versions will follow an incremental, decimal numbering system. More specifically, each successive draft of a document is numbered sequentially from version 0.1, 0.2, 0.3… until a final version is complete. Final versions will be indicated by whole numbers (e.g., version 1.0). Final versions of documents that undergo revisions will be labeled version X.1 for the first set of revisions. While the document is under review, subsequent draft versions will increase incrementally (e.g., 1.2, 1.3, 1.4) until a revised final version is complete (e.g., version 2.0).

In the event data retrieval is requested and to prevent loss of data, all draft and final file versions will be retained electronically—that is, superseded versions will not be deleted.

Note that changes made to deliverables will be documented using the software's *track changes* feature, which allows a user to track and view all changes that are made to the document version. All deliverable reviews will be documented in a QC Documentation Form (see **Appendix B**) for the project. This form will be maintained in the project files.

For this project, it is not anticipated that any special hardware or software will be used. General software available through the Microsoft Suite including Excel, PowerPoint, Access, and Word will be sufficient to perform the work (described in **Tables 2.1 – 2.5)** for this project.

3. Assessment and Oversight (Group C)

LFUCG is committed to preparing a comprehensive and reliable inventory of GHG emissions for the Lexington-Fayette MSA. Under this project our senior management team has dedicated the necessary resources to ensure we deliver an inventory that can be relied upon for future policy decisions. Accordingly, under this project, we will concurrently implement existing quality management systems that LFUCG has previously utilized for submissions to the EPA under Title I of the Act where task-level deliverables will be subjected to required, regular reviews (e.g., quarterly) to ensure that technical, financial, and schedule requirements of this project are consistent with the EPA PO's and QAM's expectations for handling and producing deliverables that reflect high-quality environment data. This section discusses Elements C1 (assessments and response actions) and C2 (reporting) applicable to this project.

3.1. Assessments and Response Actions

The QA program includes periodic review of data files and draft deliverables. The essential steps in the QA program are as follows:

1. Identify and define the problem
2. Assign responsibility for investigating the problem
3. Investigate and determine the cause of the problem
4. Assign and accept responsibility for implementing appropriate corrective actions
5. Establish the effectiveness of and implement the corrective action
6. Verify that the corrective action has eliminated the problem.

The TL will provide day-to-day oversight of the quality system. Periodic project file reviews will be carried out by the QA Manager, at least once per year to verify that required records, documentation, and technical review information are maintained in the files. The QAM will ensure that problems found during the review are brought to the attention of the TL and are corrected immediately. All nonconforming data will be noted, and corrective measures to bring nonconforming data into conformance will be recorded.

The TL and QA Manager are responsible for determining if the quality system established for the project is appropriate and functioning in a manner that ensures the integrity of all work products. All technical staff have roles and will participate in the corrective action process. Corrective actions for errors found during QC checks will be determined by the TL and, if necessary, with direction from the QA Manager or PM, as appropriate. The originator of the work will make the corrections and will note on the QC form that the errors were corrected. A reviewer or TL, not involved in the creation of the work, will review the corrections to ensure the errors were corrected. Any problems noted during audits will be reviewed and corrected by the QA Manager and discussed with the TL as needed. Depending on the severity of the deficiency, the TL may consult the QA Manager and stop work until the cited deficiency is resolved. Deficiencies identified and their resolution will be documented in monthly project reports, as applicable. The QA Manager and TL will comply and respond to all internal and EPA audits on the project, as needed. The QA Manager will produce a report outlining any corrective actions taken.

3.2. Reports to Management

The periodic progress reports (to the EPA PO) required in the grant agreement will be reviewed by the PM and the PM's manager (Jennifer Carey, LFUCG Director of Environmental Services) to ensure the project is meeting milestones and that the resources committed to the project are sufficient to meet project objectives. These periodic progress reports will describe the status of the project, accomplishments during the reporting period, activities planned for the next period, and any special problems or events including any QA/QC issues. Reports to the EPA will be drafted by the TL or other project staff familiar with project activities during the reporting period.

Any QC issues impacting the quality of a deliverable, the project budget, or schedule will be identified and promptly discussed with the assigned TL and the PM or QAM as appropriate. All significant findings will be included in monthly reports with the methods used to resolve the specific QC issue or the recommendations for resolution for consideration by the EPA's PO or designee.

Based on the technical work completed during the reporting period, progress reports will be reviewed internally by an independent, qualified technical person (equivalent or senior to the TL), prior to submitting to the PM. The PM will conduct a final review of the report before transmitting the progress report to the EPA PO, and the PM's manager will be cc'd on all progress reports.

4. Data Validation and Usability (Group D)

4.1. Data Review, Verification, Validation

All work conducted under this project will be subject to technical and editorial review. When existing data for the same GHG-emitting activity are available from multiple sources, the background information documents will be reviewed for all sources to determine the dataset that is the most representative of local operations. Additionally, the inventory report will include the vintage of the existing data resource and preference will be given to the most recent dataset that is representative of similar GHG-emitting local activities. Reviews will be conducted by an independent, qualified person—or a person not directly involved in the production of the deliverable. The term "validation" refers to whether the data meet the QAPP-defined user requirements while the term "verification" refers to whether conclusions can be correctly drawn from the data. The quality of data used and generated for the project will be reviewed and verified at multiple levels by the project team. This review will be conducted by the TL or a senior technical reviewer with specific, applicable expertise. All original and modified data files will be reviewed for input, handling, and calculation errors. Additionally, all units of measure will be checked for consistency. Any potential issues identified through this review process will be evaluated and, if necessary, data will be corrected, and analysis will be revised as necessary, using corrected data. These corrections will be documented in project records. These measures of data quality will be used to judge whether the data are acceptable for their intended use. In cases where available data do not or may not meet data quality acceptance criteria, the TL will document these findings in the inventory along with corrective actions or use of alternative data sources.

4.2. Verification and Validation Methods

As a standard operating procedure, all data (retrieved and generated) will be verified and validated through a review of data files by an independent, qualified technical staff member (i.e., someone other than the document originator), and ultimately, the TL. A checklist of QC activities for deliverables under this project is provided as **Appendix A**. Forms for documenting QC activities and review of deliverables are included in **Appendix B**. Documentation of calculations will be included in spreadsheet work products and in supporting memoranda, as appropriate.

The TL is responsible for day-to-day technical activities of tasks, including planning, data gathering, documentation, reporting, and controlling technical and financial resources. The TL is the primary person responsible for quality of work on tasks under this project and will approve all-related plans and reports. These reports will be transmitted by the TL to the QAM for final review and approval.

Source data will be verified and validated through a review of data files by the technical staff, and ultimately the TL. Reviews of analyses will include a thorough evaluation of content and calculated values. All original and modified data files will be reviewed for input, handling, and calculation errors. Additionally, all measurement units will be checked for consistency. Any potential issues identified through this review process will be evaluated, errors corrected, and analysis repeated using the corrected data. All corrections will be documented in project records.

Source data will be verified and validated through a review of data files by the technical staff, and ultimately the TL. Typical data verification reviews can include checks of the following:

- Data sources are clearly documented,
- Calculations are appropriately documented,

- All relevant assumptions are clearly documented,
- Conclusions are relevant and supported by results,
- Text is well-written and easy to understand.

The documented review process will be stored with deliverables for the project. For the narrative describing the methodologies used for the inventory, all comments on drafts will be clearly and concisely summarized including a description of how substantive issues raised by commenters were resolved.

As discussed in Section 1.7, QC objectives include verification that data in database tables are stored and transferred correctly, algorithms call data correctly, units are internally consistent, and reports pull the required data. These data management issues will be addressed as part of the QC checks of data acquisition and document preparation.

For this project, it is not anticipated that any special data validation software will be required. However, where calculations are required to assess the data/datasets, calculations will be performed using computer spreadsheets (like Excel spreadsheets with predefined functions, or formulas) and calculators to reduce typographical or translation errors. General software available through the Microsoft Suite including Excel, PowerPoint, Access, and Word will be sufficient to perform the work as described in Section 1.6 for this project.

4.3. Reconciliation with User Requirements

All data (retrieved and generated) and deliverables in this project will be analyzed and reconciled with project data quality requirements. To ensure deliverables meet user requirements, the TL or senior technical lead will review all data and deliverables throughout the project to ensure that the data, methodologies, and tools used meet data quality objectives, are clearly conveyed, and represent sound and established science.

LFUCG will review each project with the EPA at the planning stage to ensure the approach is fundamentally sound and will meet the project objectives. The TL or senior technical lead will evaluate data continuously during the life term of the project to ensure they are of sufficient quality and quantity to meet the project goals. Prior to submission of draft and final products, the TL or senior technical lead will make a final assessment to determine if the objectives have been fulfilled in a technically sound manner. Assumptions made in preparing project analyses will be clearly specified in the inventory.

As discussed in Section 1.7.1, uncertainty can be evaluated using a few different approaches. The most useful uncertainty analysis is quantitative and is based on statistical characteristics of the data such as the variance and bias of estimates. In a sensitivity analysis, the effect of a single variable on the resulting emissions estimate generated by a model (or calculation) is evaluated by varying its value while holding all other variables constant. Sensitivity analyses will help focus on the data that have the greatest impact on the output data. Additional statistical tests may be utilized depending on the need for more or less rigorous tools and on the specific inventory activity being evaluated.

5. References

EPA, Chief Information Officer's Policy Directive on Information Technology / Information Management available at EPA IT/IM Directive: Environmental Information Quality Policy, Directive # CIO 2105.3

EPA, *Chief Information Officer's Policy Directive on Information Technology / Information Management: Quality Assurance Project Plan (QAPP) Standard*, Directive # CIO 2105-S-02.0. Available at https://www.epa.gov/irmpoli8/quality-assurance-project-plan-qapp-standard. Accessed on 7/24/2023.

EPA, EPA-454/B-17-001, *Quality Assurance Handbook for Air Pollution Measurement Systems, Ambient Air Quality Monitoring Program, Volume II*. Available at https://www3.epa.gov/ttnamti1/files/ambient/pm25/qa/Final%20Handbook%20Document%201117.pdf. Accessed on 6/23/2023.

EPA, Fact Sheet: Areas where differences between state GHG inventories and the EPA's Inventory of U.S. GHG Emissions and Sinks by State: 1990-2020 estimates may occur. Available at https://www.epa.gov/system/files/documents/2022-03/fact-sheet-differences-epa-and-offical-state-ghgi.pdf. Accessed on 6/23/2023.

EPA, US GHG Inventory by State. Available at https://www.epa.gov/ghgemissions/state-ghg-emissions-and-removals. Accessed on 6/23/2023.

EPA, GHG Reporting Program Facility-level Local Information. Available at https://ghgdata.epa.gov/ghgp/main.do. Accessed on 7/18/2023.

EPA, Data reported to EPA's Greenhouse Gas Reporting Program (GHGRP) at https://www.epa.gov/ghgreporting/data-sets

EPA, National Inventory at https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021

EPA, Publications, Tools, and Data for State, Local, and Tribal Governments at https://www.epa.gov/statelocalenergy/publications-tools-and-data-state-local-and-tribal-governments. Accessed on 7/27/2023.

EPA, Fuel heating values and CO2 emission factors at eCFR :: 40 CFR Part 98 -- Mandatory Greenhouse Gas Reporting

EPA, Global warming potentials at https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-A?toc=1

USDA, Forest Service at https://www.fs.usda.gov/research/treesearch/62418

US DOT, Federal Highway Administration Transportation Statistics at https://www.fhwa.dot.gov/policyinformation/statistics/2021/vm1.cfm

Appendix A: Example Checklists of Quality Control Activities for Deliverables

Tasks and Deliverables	Quality Control Procedures
Task 1. Mobile Combustion (Transportation)	
Local inventory of GHG emissions from mobile sources with documentation of the following QC activities: (1) narrative report describing data sources and QC measures for data acquisition steps, (2) description of methodology and QC measures for validated proper implementation of methodology, and (3) documentation of QAPP implementation. (4) listing of emissions reductions options are present with documentation of rationale for each option.	1. Comparison of local estimate of average miles travelled per year and average miles per gallon (by vehicle type) versus state and national averages.

Vehicle Type	Local Avg Miles/yr	QC Avg Miles/yr	MPY Statistics*	Local Avg Miles/gal	QC Avg Miles/gal	MPG Statistics
Passenger Car (Gasoline)			Signed Bias Variance		24.1	Signed Bias Variance
Passenger Truck (Gasoline)					18.5	
Heavy-duty (Gasoline)					10.1	
Motorcycle (Gasoline)					50	
Passenger Car (Diesel)					32.4	
Passenger Truck (Diesel)					22.1	
Heavy-duty (Diesel)					13.0	

* Precision and bias calculations will be in accordance with the EPA's Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the community's estimate taken as the measured value and the LGGIT value taken as the audit value.

2. For any values used in local inventory that differ from the state average MPY or the national average MPG by more than 25%, the community will provide an explanation of why local factors may differ from state or national averages.

3. Ensure the GWPs used for the local estimate and the LGGIT estimate are on the same basis. The LGGIT tool uses AR5 GWP (e.g., methane GWP = 28).

4. Review by TL or senior technical reviewer—analytical methods / results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of technical detail is appropriate.

5. Editor review—verify or remediate draft deliverables to ensure clear, error-free writing.

Tasks and Deliverables	**Quality Control Procedures**
Task 2. Electric Power Consumption	
Local inventory of GHG emissions from electric power consumption with documentation of the following QC activities: (1) narrative report describing data sources and QC measures for data acquisition steps, (2) description of methodology and QC measures for validated proper implementation of methodology, and (3) documentation of QAPP implementation. (4) listing of emissions reductions options are present with documentation of rationale for each option.	1. Compare (a) the local estimate in inventory *versus* (b) data from SLOPE[15], state averages, or other data resources available from DOE such as Form EIA 861 data. Use a table similar to the table below to assess precision and bias of the local estimates versus estimates derived from SLOPE, state averages, or representative EIA 861 data, if available: 2. SLOPE data are provided in million British thermal units (MMBtu's) of electricity usage, EIA 861 usage data are provided in megawatt-hours (MWh), but the LGGIT inputs for electricity usage must be in kilowatt-hours (kWh). When comparing any two datasets, ensure that the units of measure are converted to a consistent basis prior to making the comparison. 3. Ensure the GWPs used for the local estimate and the independent estimate are on the same basis. 4. Technical review of methods, calculations, and underlying datasets—data are appropriate for intended use, data are complete and representative and current, data sources documented, analytical methods are appropriate, and calculations are accurate. 5. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of technical detail is appropriate) 6. Editor review—writing is clear, free of grammatical and typographical errors.

Power Consuming Sector	Initial Local Estimate (Metric Tons CO_2e)	QC Estimate (Metric Tons CO_2e)	Statistics*
Residential			Signed Bias
Commercial			
Industrial			
Transportation			Variance
Other			

* Precision and bias calculations will be in accordance with the EPA's Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the community's estimate taken as the measured value and the SIT value taken as the audit value.

[15] National Renewable Energy Laboratory. "[Data Set Title (e.g., Battery Storage Capital Costs)]," *State and Local Planning for Energy*, accessed 7/22/2023, https://maps.nrel.gov/slope.

<table>
<tr><th>Tasks and Deliverables</th><th>Quality Control Procedures</th></tr>
<tr><td colspan="2">Task 3. Solid Waste (Landfills)</td></tr>
<tr><td>Local inventory of GHG emissions from landfills with documentation of the following QC activities:

(1) narrative report describing data sources and QC measures for data acquisition steps,

(2) description of methodology and QC measures for validated proper implementation of methodology, and

(3) documentation of QAPP implementation.

(4) listing of emissions reductions options are present with documentation of rationale for each option.</td><td>1. Comparison of (a) independent local inventory versus (b) landfill data from FLIGHT. Use a table similar to the table below to assess precision and bias of the local inventory versus QC estimates:

<table>
<tr><th>Solid Waste (Landfills)</th><th>Initial Local Estimate (Metric Tons CO_2e)</th><th>FLIGHT Data (Metric Tons CO_2e)</th><th>Statistics* for Area Comparisons</th></tr>
<tr><td>North Elm Landfill</td><td></td><td></td><td rowspan="4">Signed Bias

Variance</td></tr>
<tr><td>East Hill Landfill</td><td></td><td></td></tr>
<tr><td>Landfill No. 1 (closed)</td><td></td><td></td></tr>
<tr><td>…</td><td></td><td></td></tr>
</table>
* Precision and bias calculations will be in accordance with the EPA's Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the community's estimate taken as the measured value and the SIT value taken as the audit value.

2. When comparing any two datasets, ensure that the units of measure are converted to a consistent basis prior to making the comparison.
3. Ensure the GWPs used for the local estimate and independent estimate are on the same basis.
4. Ensure data are appropriate for intended use, data are complete and representative and current, data sources are documented, analytical methods are appropriate, and calculations are accurate. Include any QC findings and reconciliation.
5. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of technical detail is appropriate)
6. Editor review—writing is clear, free of grammatical and typing errors.</td></tr>
</table>

Tasks and Deliverables	Quality Control Procedures
Task 4. GHG Emissions for Other Sources	
Local inventory of GHG emissions from the community's other sources with documentation of the following QC activities: (1) narrative report describing data sources and QC measures for data acquisition steps, (2) description of methodology and QC measures for validated proper implementation of methodology, and (3) documentation of QAPP implementation. (4) listing of emissions reductions options are present with documentation of rationale for each option.	1. Comparison of (a) local emissions estimates in inventory *versus* (b) available federal or state estimates for the same source categories (e.g. SLOPE, FLIGHT, etc.). 2. For any values used in local inventory that are inconsistent with federal or state values, the table below will be utilized to assess precision and bias of the local inventory versus the federal or state estimates: 3. When comparing any two datasets, ensure that the units of measure are converted to a consistent basis prior to making the comparison. 4. Ensure the GWPs used for the local estimate and independent estimate are on the same basis. 5. Technical review of methods, calculations, and underlying datasets—data are appropriate for intended use, data are complete and representative and current, data sources documented, analytical methods are appropriate, and calculations are accurate. 6. Review by TL or senior technical reviewer—analytical methods and results are explained clearly, technical terms are defined, conclusions are reasonable based on information presented, and level of detail appropriate. 7. Editor review: writing is clear, free of grammatical and typographical errors.

Other Sectors	Initial Local Estimate (Metric Tons CO_2e)	QC Estimate (Metric Tons CO_2e)	Statistics*
Stationary combustion			Signed Bias Variance
Agriculture & land management			
Waste generation			
Water			
Wastewater treatment			
Other			

* Precision and bias calculations will be in accordance with the EPA's Data Assessment Statistical Calculator (DASC) Tool available at https://www.epa.gov/sites/default/files/2020-10/dasc_11_3_17.xls with the community's estimate taken as the measured value and the SIT value taken as the audit value.

Lexington-Fayette MSA

Documentation of QA Review and Approval of Electronic Deliverables

Approvals on this form verify that all technical and editorial reviews have been completed and the deliverable meets the criteria for scientific defensibility, technical, and editorial accuracy, and presentation clarity as outlined in the Quality Assurance (QA) Project Plan, QA Narrative, Quality Management Plan, and/or according to direction from the EPA PO.

Client:	EPA Region 4
Grant Number:	02D55923
EPA Project Officer:	Maya Odeh-Adimah
Project Number:	213-11681-24001
Project Name:	Lexington-Fayette Co. MSA QAPP & PCAP
Grantee Org. Project Manager	Jada Walker Griggs

QA Form Details

Item Number	File Name (Copy the name of the File Reviewed)	Deliverable Description	Date Sent to Client	Deliverable (Draft)	Deliverable (Final)	Document Originator	QA Review Information (Review Type)	(Reviewer Name)	(Date Review was Performed)	(Brief Summary of Review Findings and Other Notes)	QA Review Information (Have all Findings Been Resolved)	(Originator Signature)	(Reviewer Signature)	(File Location) *Copy Long Folder Path Name*
01	Draft PCAP Cover 02.20.24	Report Cover	20-Feb-24	☑	☐	Tetra Tech	***Technical***	N/A	N/A	N/A	☑ Yes	Tetra Tech	Abby Terry	P:\11681\213-11681-24001\Deliverables\PCAP\DRAFT
							Editorial	Chris Evilia	20-Feb-24	Photo changed from vehicles on road to resident on biking path, LFUCG and Tetra Tech logos added	☑ Yes	Tetra Tech	Chris Evilia	
02	DRAFT - Lexington-Fayette MSA Priority Climate Action Plan - 02.29.24	Draft report including GHG inventory documentation and priority measures documentation	26-Feb-24	☑	☐	Tetra Tech	***Technical***	Tetra Tech	24-Feb-24	GHG inventory and emissions reductions calculations verified	☑ Yes	Tetra Tech	Abby Terry	P:\11681\213-11681-24001\Deliverables\PCAP\DRAFT
							Editorial	Chris Evilia	24-Feb-24	Formatting and wording updated throughout	☑ Yes	Tetra Tech	Chris Evilia	
03	FINAL - Lexington-Fayette MSA Priority Climate Action Plan - 02.29.25	Final report including GHG inventory documentation and priority measures documentation	29-Feb-24	☐	☑	Tetra Tech	***Technical***	Tetra Tech	26-Feb-24	Lextran canopy project capacity updated from 15 buses for Phase 1 to 29 total buses	☑ Yes	Tetra Tech	Abby Terry	P:\11681\213-11681-24001\Deliverables\PCAP\FINAL
							Editorial	Chris Evilia	26-Feb-24	Formatting and wording updated throughout	☑ Yes	Tetra Tech	Chris Evilia	
04				☐	☐		***Technical***				☐ Yes			
							Technical				☐ Yes			
05				☐	☐		***Technical***				☐ Yes			
							Technical				☐ Yes			
06				☐	☐		***Technical***				☐ Yes			
							Technical				☐ Yes			
07				☐	☐		***Technical***				☐ Yes			
							Technical				☐ Yes			
08				☐	☐		***Technical***				☐ Yes			
							Technical				☐ Yes			
09				☐	☐		***Technical***				☐ Yes			

Appendix C: Compliance with Requirements Under the Privacy Act of 1974

Important Note about Personally Identifiable Information (PII)

The Privacy Act of 1974 (5 U.S.C. § 552a) mandates how federal agencies maintain records about individuals. Per OMB Circular A-130, Personally Identifiable Information (PII) is "information that can be used to distinguish or trace an individual's identity, either alone or when combined with other information that is linked or linkable to a specific individual."

EPA systems/applications that collect PII must comply with EPA's Privacy Policy and procedures to guard against unauthorized disclosure or misuse of PII in all forms. For more information click here. If PII are collected, then the QAPP will describe how the PII are managed and controlled.

Personally identifiable information (PII):

Please verify one of the following two options by checking the corresponding box:

1. This project **will not** collect Personally Identifiable Information (PII) ☒:
2. This project **will** collect Personally Identifiable Information (PII): ☐

This QAPP will comply with 5 U.S.C. § 552a and EPA's Privacy Policy.

Appendix B –
GHG Inventory Documentation

This appendix explains the methodology and assumptions used for developing the calendar year 2021 GHG inventory included in the Lexington-Fayette MSA PCAP.

For this inventory, GWPs over a 100-year timeframe for the following GHGs were selected from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2013):

- Carbon Dioxide (CO2): GWP = 1 (by definition)
- Methane (CH4): GWP = 28
- Nitrous Oxide (N2O): GWP = 265
- Nitrogen Trifluoride (NF3): GWP = 16,100
- Sulfur Hexafluoride (SF6): GWP = 23,500
- Hydrofluorocarbons (HFCs): GWPs vary significantly but can be in the hundreds to thousands
- Perfluorocarbons (PFCs): GWPs vary, often in the thousands

A Local Greenhouse Gas Inventory Tool (LGGIT) workbook (https://www.epa.gov/statelocalenergy/local-greenhouse-gas-inventory-tool) was completed for each county and the results were totaled.

Electricity Consumption

Electricity Usage/Stationary Combustion:

Methodology:

- The State and Local Planning for Energy (SLOPE) model datasets were obtained for Bourbon, Clark, Fayette, Jessamine, Scott, and Woodford Counties.
- This data is published in the units of MMBtu for each county. Data points were converted to kilowatt-hours for electricity consumption and thousand cubic feet (MCF) for natural gas.
- SLOPE contained data for 2020 and 2025. Population estimates for 2021 from the U.S. Census Bureau were used to scale the 2020 data.
- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.

Assumptions/Disclosures:

- SLOPE notes that energy consumption data is modeled and has a high degree of uncertainty.

Models/Tools Used:

- SLOPE - Data Viewer (Net Electricity and Natural Gas Consumption) | State and Local Planning for Energy | NREL
- U.S. Census Bureau - https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html#v2022
- eGRID - https://www.epa.gov/egrid/data-explorer

Conversion/Emission Factors:

- Electricity emission factors for Kentucky in 2021 were obtained from eGRID. They are listed below:

KY Electricity Emission Factors for 2021

Emission Factors (lb/MWh)			Total EF
CO_2	CH_4	N_2O	lb CO_2e / MWh
1,727.09	0.186	0.027	1,739.45

- 1 kilowatt-hour of electricity equals 3,412 Btu https://portfoliomanager.energystar.gov/pdf/reference/Thermal%20Conversions.pdf
- 1 MCF equals 1.038 MMBtu https://www.eia.gov/tools/faqs/faq.php?id=45&t=8#:~:text=One%20thousand%20cubic%20feet%20(Mcf,1.038%20MMBtu%2C%20or%2010.38%20therms

Electrical Transmission

Methodology:

- The national SF_6 emissions attributed to electrical transmission and distribution were obtained from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021.*

- The populations of each MSA county and the United States were obtained from the U.S. Census Bureau.
- The formula below was applied to calculate the SF_6 emissions in MT CO2e:

Electrical Transmission and Distribution Emissions

National Emissions x (Population of Fayette County / Population of U.S.)

- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.

Assumptions/Disclosures:

- It is assumed that the nationwide emissions totals included in the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021* are accurate.

Models/Tools Used:

- U.S. Inventory of Greenhouse Gas Emissions and Sinks: 1990-2021 – https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021
- U.S. Census Bureau – https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html#v2022

Imported Water

Methodology:

- Total water produced and purchased for water systems in each county importing water was obtained from the Kentucky Infrastructure Authority Water Resources Information System database.
- The percentage of water purchased was used as the percentage of total water imported.
- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.

Assumptions/Disclosures:

- Information obtained from Kentucky Infrastructure Authority Water Resources Information System is assumed to be correct.

Models/Tools Used:

- Kentucky Infrastructure Authority WRIS – https://wris.ky.gov/portal/SysData.aspx

Conversion/Emission Factors:

- Default factors provided by the LGGIT were used.

Transportation

On-Road

Methodology:

- The number of passenger cars and trucks, buses, RVs, and motorcycles registered in each county and the split between non-commercial and commercial/institutional were obtained from the Kentucky Transportation Cabinets' DataMart website.
- The distribution of passenger cars and trucks by fuel type was also obtained from DataMart.
- Daily VMT (in thousands of miles) in 2021 were obtained from the Kentucky Transportation Cabinet.
- The daily VMT were converted to an annual total using the formula below:

Annual VMT

Daily VMT (in thousands) x 1000 x 365

- Each category of vehicle VMT was multiplied by the applicable fuel ratio and the further split into residential or commercial using the formula below:

VMT by Vehicle, Fuel, and Ownership

Annual VMT x Vehicle Type Percentage x Fuel Type Percentage x Ownership Percentage

- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.

Assumptions/Disclosures:

- Heavy trucks were assumed to account for approximately 12% of the VMT total based on a report from the KY Trucking Association.
- Passenger cars were assumed to be 36.5% of the passenger car/truck total and passenger trucks were assumed to be 63.5% based on totals listed in the State Motor-Vehicle Registrations Report (MV-1) from the U.S. Department of Transportation Federal Highway Administration.
- 50% of VMT allocated to hybrids were assumed to be gasoline.
- Motorcycle VMT were assumed to be 100% gasoline.
- RV VMT were assumed to be 50% diesel and 50% gasoline.
- Biodiesel was conservatively assumed to be B5.
- Heavy-duty truck VMT were assumed to be 100% commercial.
- On-road vehicle mobile combustion emission factors for CH4 and N2O are based on the age of the vehicle. The base emission factor for each category was selected based on a worst-case scenario.

Models/Tools Used:

- KY DataMart – https://datamart.kytc.ky.gov/
- KY Transportation Cabinet VMT – https://transportation.ky.gov/Planning/Pages/Roadway-Information-and-Data.aspx
- U.S. Department of Transportation Federal Highway Administration MV-1 Report - https://www.fhwa.dot.gov/policyinformation/statistics/2021/

Conversion/Emission Factors:

- VMT were converted to fuel consumption using average miles per gallon values from the LGGIT.

Average Miles Per Gallon

Vehicle Type	Average MPG	
	Gasoline & Other Fuels	Diesel & Biodiesel
Passenger Car	24.1	32.4
Light Truck	18.5	22.1
Heavy-Duty Vehicle	10.13	12.96
Motorcycle	50	N/A

- Default emission factors provided in the LGGIT were used.

Non-Road

Methodology:

- Off-road emissions were obtained from the NEI Data Retrieval Tool.
- CH4 emissions were multiplied by the corresponding GWP to calculate MT CO2e.
- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.

Assumptions/Disclosures:

- These emissions were reported by facilities for the NEI. It is assumed that these totals are accurate.
- The NEI is compiled on 3-year cycles with 2020 being the most recent release.

Models/Tools Used:

- National Emissions Inventory - https://awsedap.epa.gov/public/single/?appid=20230c40-026d-494e-903f-3f112761a208&sheet=5d3fdda7-14bc-4284-a9bb-cfd856b9348d&opt=ctxmenu,currsel

Aviation

Methodology:

- The number of departing and incoming flights to the Blue Grass Airport for 2021 and past years was obtained from the Bureau of Transportation Statistics' TranStats database.
- A ratio was developed between number of flights and historical fuel usage to estimate jet fuel consumption using the formula below:

Jet Fuel Consumption

Historical Jet Fuel Usage / (Historical Number of Departing Flights + Historical Number of Incoming Flights)

- This ratio was multiplied by the sum of the incoming and departing flights in 2021 to estimate the total fuel consumption.
- The CO2 emissions were estimated using the formula below:

CO_2 Emissions from Jet Fuel Combustion

Historical Flight to Fuel Ratio x (Departing + Incoming Flights in 2021) x EF

- Ten percent of these emissions were allocated to Scope 1 and the remaining 90 percent were allocated to Scope 3 (out of boundary) emissions.
- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.

Assumptions/Disclosures:

- Jet fuel and aviation gas usage at Blue Grass Airport for 2021 was unable to be obtained.
- It was assumed that 10% of fuel usage occurs during the landing and take-off (LTO) cycle.
- Scope 3 emissions for the other MSA counties were not estimated (NE).

Models/Tools Used:

- Bureau of Transportation Statistics TranStats - https://www.transtats.bts.gov/Data_Elements.aspx?Data=2

- EPA Greenhouse Gas Emission Factor Hub – https://www.epa.gov/climateleadership/ghg-emission-factors-hub

Conversion/Emission Factors:

- An emission factor for jet fuel was selected from the EPA's 2021 *Greenhouse Gas Emission Factors Hub*. It is listed below:

CO_2 Gas Emission Factors for Mobile Combustion

	CO_2 (kg CO_2/gal)
Jet Fuel	9.75

Waste/Wastewater:

Solid Waste

Methodology:

- The *2021 Waste Quantity Report* was obtained from the KY DWM Solid Waste Branch. The report contained information regarding the quantity, type, and disposal location for municipal solid waste, special waste, industrial waste, and construction and demolition debris.
- The 2022 Waste Characterization Report was obtained from LFUCG's website. The report contained information on the composition of Fayette County's waste.
- The waste was allocated to the characterization categories provided in the WARM Tool based on the characterization provided in the 2022 Waste Characterization Report.
- Data for each landfill was input into its own WARM workbook and the resulting emissions were summed to obtain the overall total.
- Scott County is the only county in the MSA with an active landfill. Scope 1 emissions associated with the landfill were obtained from EPA's FLIGHT Tool.

Assumptions/Disclosures:

- The EPA Waste Reduction Model (WARM V15.1) was used to model GHG emissions from solid waste. The WARM tool utilizes a methane commitment method approach since the GHG emission factors used are based on a life cycle perspective.
- The methane commitment model is based on the quantity of waste disposed of during the inventory year and does not represent emissions during the inventory year. It combines current and future emissions and treats them as equal.
- Waste totals were obtained from the KY Division of Waste Management, Solid Waste Branch *2021 Waste Quantity Report*. It is assumed that these totals are accurate.
- The *2022 Waste Characterization Study* was used and assumed to be representative of 2021.
- Waste characterization data was unavailable for the other MSA counties. Waste composition was assumed to be similar to Fayette County.
- Waste characterization allocation was assigned according to percent of total waste each landfill received.
- Special Waste is assumed to be WWTP sludge and was assigned the waste characterization category of "Mixed Organics."
- Industrial waste was not considered.
- Emissions for Central Kentucky Landfill in Scott County listed in EPA's FLIGHT Tool are assumed to be correct.

Models/Tools Used:

- 2021 Waste Quantity Report - https://eec.ky.gov/Environmental-Protection/Waste/Solid%20Waste%20Branch%20Facility%20Reports/Waste%20Quantity%20Report%202021.xlsx
- 2022 Waste Characterization Report - https://drive.google.com/file/d/13YVXwPcQlrejhCyWUcwEvOwGKNmYMOwP/view
- Waste Reduction Model - https://www.epa.gov/warm
- EPA FLIGHT - https://ghgdata.epa.gov/ghgp/

Conversion/Emission Factors:

- Default factors provided in WARM were used.

Wastewater

Methodology:

- Population served and system type data for wastewater treatment plants in each county were obtained from the Kentucky Infrastructure Authority WRIS database and permits in KY eSearch, respectively.
- The population served listed for each wastewater treatment plant was subtracted from the total county population to determine the unsewered population.
- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.

Assumptions/Disclosures:

- Population served obtained from Kentucky Infrastructure Authority WRIS is assumed to be correct.

Models/Tools Used:

- Kentucky Infrastructure Authority WRIS - https://wris.ky.gov/portal/SysData.aspx
- KY eSearch - https://dep.gateway.ky.gov/eSearch/Approvals/Issued

Conversion/Emission Factors:

- Default factors provided by the LGGIT were used.

Agriculture

Enteric Fermentation

Methodology:

- Head counts for horses were obtained from the *2022 Kentucky Equine Survey.*
- Head counts for cattle and dairy cows were obtained from the *KY Agricultural Statistics 2021 Annual Bulletin*.
- Head counts for goats, sheep, and layers were obtained from the *2017 USDA Census of Ag*.
- The CH4 emissions due to enteric fermentation were calculated using the following formula:

Enteric Fermentation Emissions

Heads of Livestock x EF x 0.001 (kg to tonnes)

- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.

Assumptions/Disclosures:

- The *Kentucky Equine Survey* was completed in 2022. It was assumed that equine counts were comparable for 2021.
- The *USDA Census of Ag* is completed every five years. The most current survey for the reporting year was completed in 2017.
- The *USDA National Agricultural Statistics Service Cattle County Estimates* as of January 1, 2022 does not segregate beef cows and milk cows for Fayette County. The MSA counties' milk cow counts are included in "Other Counties" with a total of 2,500 milk cows. A conservative estimate of 500 milk cows per county was assumed and subtracted from the total cattle number listed in the *USDA National Agricultural Statistics Service Cattle County Estimates*.

Models/Tools Used:

- Kentucky Equine Survey - https://equine.ca.uky.edu/kyequinesurvey

- USDA National Agricultural Statistics Service Cattle County Estimates - https://www.nass.usda.gov/Statistics_by_State/Kentucky/Publications/County_Estimates/coest/2020/Cattle21_KY.pdf
- USDA Census of Ag - https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Kentucky/index.php

Conversion/Emission Factors:

- Tier 1 emission factors for enteric fermentation were obtained from *IPCC 2006: Volume 5, Chapter 10 Emissions from Livestock and Manure Management*. They are listed below:

CH_4 Emission Factors for Enteric Fermentation

Livestock	CH_4 (kg/head per year)
Dairy Cows	128
Other Cattle	53
Horses	18
Sheep	8
Goats	5

Manure Management

Methodology:

- Head counts for horses were obtained from the *2022 Kentucky Equine Survey.*
- Head counts for cattle and dairy cows were obtained from the *KY Agricultural Statistics 2021 Annual Bulletin*.
- Head counts for goats, sheep, and layers were obtained from the *2017 USDA Census of Ag*.
- The CH_4 emissions due to manure management were calculated using the following formula:

Manure Management Emissions

Heads of Livestock x EF x 0.001 (kg to tonnes)

- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.

Assumptions/Disclosures:

- The *Kentucky Equine Survey* was completed in 2022. It was assumed that equine counts were comparable for 2021.
- The *USDA Census of Ag* is completed every five years. The most current survey for the reporting year was completed in 2017.
- The *USDA National Agricultural Statistics Service Cattle County Estimates* as of January 1, 2022 does not segregate beef cows and milk cows for Fayette County. The MSA counties' milk cow counts are included in "Other Counties" with a total of 2,500 milk cows. A conservative estimate of 500 milk cows per county was assumed and subtracted from the total cattle number listed in the *USDA National Agricultural Statistics Service Cattle County Estimates*.
- It is assumed that the majority of manure is deposited on the pasture in each of the MSA counties.

Models/Tools Used:

- Kentucky Equine Survey - https://equine.ca.uky.edu/kyequinesurvey
- USDA National Agricultural Statistics Service Cattle County Estimates - https://www.nass.usda.gov/Statistics_by_State/Kentucky/Publications/County_Estimates/coest/2020/Cattle21_KY.pdf
- USDA Census of Ag - https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Kentucky/index.php

Conversion/Emission Factors:

- Tier 1 emission factors for manure management were obtained from *IPCC 2006: Volume 5, Chapter 10 Emissions from Livestock and Manure Management*. They are listed below:

CH_4 Emission Factors for Manure Management

Livestock	CH_4 (kg/head per year)
Dairy Cows	55
Other Cattle	1
Horses	1.56
Sheep	0.19
Goats	0.13

Fertilizer

Methodology:

- Fertilizer tonnage for was obtained from the University of Kentucky's Division of Regulatory Services.
- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.
- The LGGIT uses the following formula:

Fertilizer Emissions

((Fertilizer Consumption) x (Percent N Content) x (1-Percent N lost to Volatilization) x (Percent from Applied N) + (Fertilizer Consumption) x (Percent N Content) x (Percent N lost to Volatilization) x (Percent from Volatized N) + (Fertilizer Consumption) x (Percent N content) x (1-Percent N lost to Volatilization) x (Percent N Leach and Runoff) x (Percent from Leached and Runoff)) x 44/28 (N_2O-N to N_2O) x GWP

Assumptions/Disclosures:

- All companies registered or licensed to sell fertilizer in KY are required to submit quarterly tonnage reports to the University of Kentucky's Division of Regulatory Services.
- Tonnage was provided in short tons.
- Usage was provided for July 2021 through June 2022. Usage for calendar year 2021 was assumed to be similar.
- Usage was only provided for the five leading grades of fertilizer.

Models/Tools Used:

- UK Division of Regulatory Services - https://www.rs.uky.edu/regulatory/fertilizer/tonnage.php

Conversion/Emission Factors:

- The LGGIT uses the following factors:

Fertilizer Factors

Fertilizer Type	Fraction of N Content	Fraction of N lost to Volatilization	Fraction of N Leach and Runoff	Fraction of N from Applied N	Fraction from Volatized N	Fraction from Leached and Runoff N
Synthetic	1	0.1	0.3	0.0125	0.01	0.025
Organic	0.037[1]	0.2	0.3	0.0125	0.01	0.025
Manure	0.005[2]	0.2	0.3	0.0125	0.01	0.025

1 – From Commercial Fertilizers 2001 (AAPFCO/TFI 2002), Table 27, as used in the U.S. GHG Inventory: 1990-2001.

2 – Assume N content of 0.5% per AAPFCO, 2000, 1999-2000 Commercia Fertilizers Data, ASCII files as is done in U.S. GHG Inventory: 1990-2001.

Unless otherwise noted, all fertilizer emission factors are IPCC default values from the Revised 1996 Guidelines for National GHG Inventories.

Urban Tree Canopy

Methodology:

- The total area of each urban area with the MSA counties was obtained.
- The average tree canopy for each area was obtained from the Tree Equity Score website.
- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.
- The workbook uses the formula below:

Urban Tree Canopy Carbon Sequestration

Total Urban Area in Sector (km^2) x Percent Urban Area with Tree Cover x 100 (km^2 to hectares) x 2.23 tonnes of C/hectare/year x 44/12 (CO_2 to C)

Models/Tools Used:

- Tree Equity Score - https://www.treeequityscore.org/map#3.38/37.22/-98.75

Assumptions/Disclosures:

- Tree canopy data is only for urban areas within the MSA counties.

Conversion/Emissions Factors:

- A carbon sequestration factor of 2.23 tonnes of C/hectare/year (per the EPA State Inventory Tools, Land Use, Land Change, and Forestry module) is used in the LGGIT.

Biomass Burning

Methodology:

- Prescribed forest burning emissions were obtained from the NEI Data Retrieval Tool.
- CH4 emissions were multiplied by the corresponding GWP to calculate MT CO2e.
- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.

Assumptions/Disclosures:

- These emissions were reported by the NEI. It is assumed that these totals are accurate.
- The NEI is compiled on 3-year cycles with 2020 being the most recent release.

Models/Tools Used:

- National Emissions Inventory - https://awsedap.epa.gov/public/single/?appid=20230c40-026d-494e-903f-

3f112761a208&sheet=5d3fdda7-14bc-4284-a9bb-cfd856b9348d&opt=ctxmenu,currsel

Industry

Methodology:

- The national HFC emissions attributed to the use of substitutes for ozone depleting substances were obtained from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021.*
- The populations of each MSA county and the United States were obtained from the U.S. Census Bureau.
- The formula below was applied to calculate the SF_6 emissions in MT CO2e:

Ozone Depleting Substances Substitute Emissions

National Emissions x (Population of Fayette County / Population of U.S.)

- QA/QC procedures from the QAPP were performed on the data.
- Data points were input into the LGGIT.

Assumptions/Disclosures:

- It is assumed that the nationwide emissions totals included in the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021* are accurate.

Models/Tools Used:

- U.S. Inventory of Greenhouse Gas Emissions and Sinks: 1990-2021 - https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021
- U.S. Census Bureau - https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html#v2022

Appendix C –
Priority Measures Documentation

This appendix explains the methodology and assumptions used for developing the priority measures emissions reduction estimations included in the Lexington-Fayette MSA PCAP.

Increasing Urban Tree Canopy

Methodology:

- The Tree Equity Score website estimates the annual quantity of carbon dioxide, particulate matter, nitrogen dioxide, sulfur dioxide, and ozone removed as a result of the plantings.
- This data was compiled for all urban areas in the MSA and is summarized in the table below:

	Tree Score of 60						
Municipality	**Trees**	**CO2 (MT)**	**PM2.5 (lbs)**	**PM10 (lbs)**	**NO2 (lbs)**	**SO2 (lbs)**	**Ozone (lbs)**
Paris	896	16	24	85	54	36	512
Winchester	1,361	24	29	178	85	57	807
Lexington	2,899	51	81	297	183	123	1,727
Nicholasville	16,297	286	457	1,690	1,014	638	9,618
Wilmore	1,191	21	33	124	74	47	703
Georgetown	2,205	39	80	248	153	102	1,439
Versailles	5,729	101	144	621	351	220	3,328
TOTAL	30,578	537	848	3,242	1,912	1,224	18,134

- It should be noted that the tool uses i-Tree methods for these calculations which assume medium-sized urban trees. To reap as many benefits as possible from the plantings, the MSA will prioritize ball and burlap tree installations. While more mature than seedlings, it is understood that it will take some years to receive the annual benefits estimated by the Tree Equity Score website.
- To estimate the possible emissions reductions by 2030 and 2050, the following assumptions were made:
    - Trees will only produce 20% of the benefits from 2025-2030.
    - Trees will produce 50% of the benefits from 2030-2035.
    - Trees will produce full benefits from 2035-2050.
- Based on these assumptions, the annual reductions provided by Tree Equity Score were prorated to produce the following results:

	CO2 (MT)	PM2.5 (lbs)	PM10 (lbs)	NO2 (lbs)	SO2 (lbs)	Ozone (lbs)
By 2030	107	170	648	382	245	3,627
By 2050	9,512	15,006	57,380	33,844	21,656	320,972

Models/Tools Used:

- Tree Equity Score - https://www.treeequityscore.org/

Residential Solar

Methodology:

- The average number of kWh (1550 kWh) produced per kW by a residential solar installation in KY was obtained from SolarReviews.com.
- The average size solar installation in KY (4-8 kW) was obtained from KY EEC's Resources for Residential Rooftop Solar Installations page. An average 6 kW was assumed.
- The average solar installation price for Solarize Lexington was found to be $21,721.07.
- A budget of $15,000,000 for solar installations was assumed. Based on this total, approximately 691 homes could be served.
- Using 6 kW x 1550 kWh, approximately 9,300 kWh of solar energy could be produced per home annually.
- Using the KY electricity emission factor of 1,739 lbs/MWh, 5,066 MT CO2e could be avoided annually by these installations.
- Extrapolating these reductions out to 2030 and 2050 yields the following reductions:

	CO2 (MT)
By 2030	25,332
By 2050	126,659

Models/Tools Used:

- SolarReviews.com - https://www.solarreviews.com/solar-panels/kentucky#:~:text=A%20solar%20system%20that%20is,year%20per%201kW%20in%20Kentucky.
- KY EEC - https://eec.ky.gov/Energy/News-Publications/Pages/Residential-Rooftop-Solar-Resources.aspx

Weatherization

Methodology:

- The U.S. DOE estimates that weatherization measures reduce energy emissions by one metric ton per home annually.
- According to Community Action Council, when U.S. DOE and Low Income Home Energy Assistance Program funds are available, homes receive up to $15,000-$20,000 for weatherization.
- A budget of $8,000,000 was assumed.
- Using a conservative estimate of $20,000 per home, 400 homes would be able to be served.
- Extrapolating these reductions out to 2030 and 2050 yields the following reductions:

	CO2 (MT)
By 2030	2,000
By 2050	10,000

Models/Tools Used:

- U.S. DOE - https://www1.eere.energy.gov/wip/pdfs/wap_factsheet.pdf

Lextran Electric Vehicle Shelter & Charging Infrastructure

Methodology:

- The average number of kWh (1550 kWh) produced per kW by a solar installation in KY was obtained from SolarReviews.com.
- On average, 1 kW can be installed per 100 square feet of roof space. Based on a canopy size of 12,000 square feet, a 120-kW array could be installed.
- Using 120 kW x 1550 kWh, approximately 186,000 kWh of solar energy could be produced annually.
- Using the KY electricity emission factor of 1,739 lbs/MWh, 147 MT CO2e could be avoided annually by this installation.
- Extrapolating these reductions out to 2030 and 2050 yields the following reductions:

	CO2 (MT)
By 2030	734
By 2050	3,668

- Lextran used the Federal Transit Administration's Transit Bus Electrification Tool to estimate lifecycle GHG emission savings for replacing a diesel bus with an electric bus. The tool accounts for eGRID subregion when considering the emissions generated from charging. The tool estimates that based on the average annual vehicle miles traveled by one of Lextran's diesel buses it produces 72 MT CO2e annually. An electric bus is estimated to produce 50% fewer emissions at about 36 MT CO2e annually.
- The canopy project will allow for 15 additional electric buses. Assuming all are converted yields the following reductions:

	CO2 (MT)
By 2030	2,710
By 2050	13,549

Models/Tools Used:

- HUD Exchange - https://files.hudexchange.info/resources/documents/Appendix-F-Rooftop-Calculation-Tool.pdf
- Federal Transit Administration's Transit Bus Electrification Tool – https://www.transit.dot.gov/regulations-and-programs/environmental-programs/fta-transit-bus-electrification-tool

Electric Vehicle Charging Need Study

Methodology:

- Based on data from the U.S. DOE Alternative Fuels Data Center and Beyond Tailpipe Emissions Calculator, electric vehicles in Kentucky produce at least 50% less emissions than gasoline vehicles.
- It is assumed that increased confidence in charging reliability will precipitate a 10% increase in EV ownership by 2030 and a 30% increase by 2050.
- The on-road gasoline emissions for the MSA were separated out and the above percentages were applied to yield the following results:

	CO2 (MT)
By 2030	125,814
By 2050	377,442

Models/Tools Used:

- Alternative Fuels Data Center - https://afdc.energy.gov/vehicles/electric_emissions.html
- Beyond Tailpipe Emissions Calculator – https://www.fueleconomy.gov/feg/Find.do?year=2024&vehicleId=46973&zipCode=40507&action=bt3

Appendix D –
Public Outreach & Coordination

Lexington selected to participate in LEED program

Thursday, April 13, 2023

Share

The U.S. Green Building Council (USGBC), creators of the LEED green building rating system, have announced that 13 cities – including Lexington – will commence certification in a national cohort supported by the LEED for Cities Local Government Leadership Program.

Jada Griggs, Program Manager Senior in the Department of Environmental Quality and Public Works, will represent the city in the program that will align the framework found in the LEED for Cities Certification with the efforts of the Empower Lexington community stakeholders group. That group will gather the necessary information for the LEED for Cities Certification while working to update the 2012 Empower Lexington Plan.

Obtaining this certification does not require Lexington residences and businesses to become LEED certified.

Griggs will be responsible for completing the LEED for Cities Certification process. She will receive guidance from the USGBC to help Lexington set energy and greenhouse gas (GHG) emissions reduction goals, develop GHG reduction targets, collect required data and apply for the certification. The benefits, resources and support that come with this program will help Lexington build on initiatives to improve our sustainability and resiliency.

“The 13 local governments selected to participate in this year’s cohort are committed to accountability and will use LEED as a tool to ensure they are on a path of continuous improvement,” says Peter Templeton, president and CEO, U.S. Green Building Council.

Bank of America partnered with USGBC to launch the Local Government Leadership Program in 2017, and has contributed more than $2.5 million to support dozens of cities and counties in their pursuit of LEED certification. The program helps local governments committed to reducing climate change and advancing resilience and social equity by measuring and tracking performance using the LEED for Cities rating system.

The 2023 cohort represents more than 3.5 million Americans in diverse places around the U.S. In addition to Lexington, the other cities selected are:

- Colorado Springs, CO
- Des Moines, IA
- Grand Junction, CO
- Lantana, FL
- Largo, FL
- Lawrence, KS
- North Miami, FL
- Palm Coast, FL
- Plano, TX
- San Diego, CA
- Scottsdale, AZ
- South Bend, IN

About the U.S. Green Building Council

The U.S. Green Building Council (USGBC) is committed to a prosperous and sustainable future through cost-efficient and energy-saving green buildings. USGBC works toward its mission of market transformation through its LEED green building U.S. GREEN BUILDING COUNCIL 3 program, robust educational offerings, an international network of local community leaders, the annual Greenbuild International Conference & Expo, the Center for Green Schools and advocacy in support of public policy that encourages and enables green buildings and communities. For more information, visit usgbc.org and connect on Twitter, Facebook and LinkedIn.

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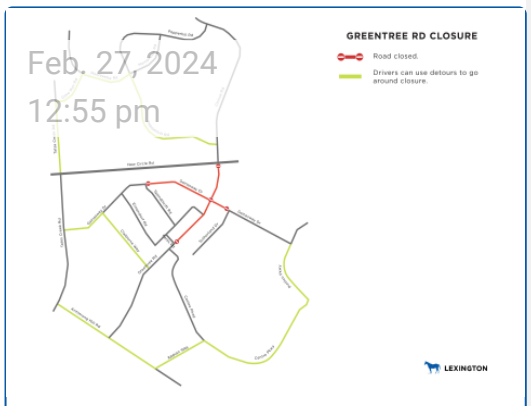

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Feedback

Public invited to provide input on Empower Lexington plan

Thursday, July 6, 2023

Share

The City of Lexington is currently seeking public input for Empower Lexington: A Plan for a Resilient Community. Input opportunities are available through scheduled in-person and virtual meetings as well as through an online survey.

The next meeting is scheduled for 6 p.m. on Tuesday, July 11 at the Lyric Theatre and Cultural Arts Center. Input kits are available for entities wishing to host their own stakeholder meeting.

The plan will guide Lexington-Fayette County in better adapting to changes – natural and manmade. Empower Lexington is a community-wide effort. It goes beyond government action.

The Empower Lexington Plan focuses on six topic areas:

- Natural systems and ecology
- Transportation and land use
- Water efficiency
- Energy and greenhouse gas emissions
- Materials and resources
- Quality of life

Social, economic and environmental considerations are embedded within each area.

Working groups reviewed the 2012 plan and updated the recommendations. Fayette County residents are invited to rank the three recommendations they feel are the most important for each area. There is also the opportunity to suggest additional recommendations. Participants may choose to provide feedback for all six areas of the plan or focus only on the areas that are most important to them.

A contractor will propose a final plan. This detailed plan will consider public input, cost of implementation, potential impact, barriers to implementation and other factors affecting the recommendations. The contractor's proposed plan will be complete in late 2023.

Fayette County residents of all backgrounds are strongly encouraged to submit input. A Spanish version of the survey and input kit is in process. If you would like these resources made available in other languages, please email LiveGreen@LexingtonKY.gov.

The online survey, registration information for the stakeholder meetings (in-person and virtual), the input kit and other Empower Lexington information can be found at lexingtonky.gov/Empower.

###

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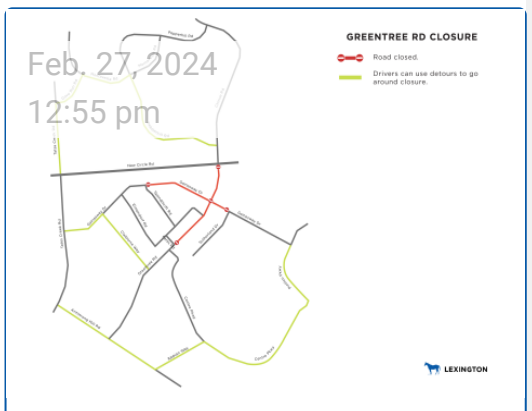

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Empower Lexington Plan Recommendations

Natural Systems and Ecology

- Preserve land with vegetative and tree cover, in both rural and urban areas.
- Preserve and develop additional greenspace within Fayette County.
- Increase equitable park and greenspace access, meeting the goal of 70% of the dwelling units having access to greenspace within 1/2-mile (800 meters) walking distance.
- Complete a comprehensive ecosystem assessment that includes the following: topography, soils, vegetation & habitat, hydrology & aquatic ecosystems, tree mapping, endangered species, flood zones, and hydrology.
- Promote awareness and appreciation of the unique qualities of soils in Fayette County and the importance of agriculture at local, regional, and national levels.
- Continue to support the Purchase of Development Rights (PDR) program.
- Explore innovative land preservation and conservation concepts (in addition to PDR) with a focus on the protection of Lexington-Fayette County's bluegrass soils.
- Implement information and engagement efforts to support existing programs that facilitate sustainable agricultural practices.
- Promote practices and policies that maintain vegetation, sequester carbon dioxide, preserve soil, and reduce surface water runoff for agricultural, residential and commercial lands.
- Provide funding for the development of a resilience plan that identifies vulnerabilities and risk capacity related to climate change and other natural and man-made hazards.
- Reduce light pollution and glare.

Transportation and Land Use

- Reduce reliance on cars and trucks by enacting the Lexington Area Bicycle and Pedestrian Master Plan.
- Develop a plan to provide more sustainable transportation options and reduce reliance on single-occupancy vehicles.
- Identify areas in need of infrastructure (e.g., sidewalks, trails, bike lanes, etc.) to encourage walking, scooting, and biking.
- Leverage existing and future reports and plans to improve transportation options, safety, and efficiency.

- Integrate green infrastructure into high quality public streets, in line with the Complete Streets Action Plan and based on the Complete Streets Design Standards.
- Implement practices that will shorten travel times for commuters using the public transit system such as signal priority for busses and/or dedicated bus lanes.
- Develop a Long Range Transit plan for the future of high-quality transit service in Lexington, complete with a funding and implementation strategy.
- Add zoning ordinance requirements for EV charging stations.
- Encourage the transition of large vehicle fleets to EV and alternative fuels.
- Assess EV and alternative fuel needs in Lexington. Develop an action plan to address any deficiencies.
- Support the creation of an organization to coordinate efforts for strategic planning and development in Lexington. The organization would pursue federal funding for equitable redevelopment in high-priority areas.
- Analyze the effects of the Urban Service Boundary on transportation and land use.

Water Efficiency

- Continue infrastructure improvements to reduce sanitary sewer pipe leakage and overflows.
- Reduce drinking water use (gallons per person).
- Manage stormwater with functional green spaces in new and redeveloped areas.
- Protect and enhance stream buffer zones throughout Fayette County.
- Build infrastructure to withstand extreme weather events and other impacts of climate change.
- Reduce pollutants entering Fayette County waterways.
- Increase tree canopy coverage to improve water quality and reduce rainwater runoff.
- Reduce or eliminate drinking water loss by updating aging infrastructure.
- Improve water efficiency in built new and redeveloped areas.

Energy and Greenhouse Gas Emissions

- Use LEED Certified Criteria (national sustainable building standards) to set LFUCG building standards.
- Set community-wide renewable energy goals as a percent of total energy used (5 years, 10 years).

- Conduct an inventory of greenhouse gas emissions every 2 years.
- Create additional, elevated sustainability positions within LFUCG including one focused on researching, applying for and implementing sustainability/resilience grants.
- Develop a list of local companies and individuals who are leaders in energy and greenhouse gas emissions. Utilize that list to coordinate a sustainability-focused business network group and establish a high-profile sustainability awards ceremony to unite the community and boost awareness.
- Fund and implement a Climate Change Vulnerability Report focused on both mitigation and adaptation initiatives.
- Allow large energy users to directly enter into long-term contracts with renewable energy developers.
- Establish a Building Energy Reporting and Disclosure Ordinance for large and medium-size buildings.
- Develop a Green Bank to expedite funding for energy efficiency and renewable energy projects.
- Create and utilize renewable biogas through organic waste collection.

Materials and Resources

- Reduce the amount of textiles/clothing sent to the landfill.
- Reduce the amount of food waste and/or organics sent to the landfill.
- Divert 35% of Construction and Demolition Debris away from landfills.
- Increase education and engagement opportunities to increase residential recycling levels and decrease contamination in the recycling stream.
- Increase community programs that encourage reuse/reduction, such as tool libraries.
- Consider establishing Extended Producer Responsibilities (ERP) policies for some items, such as batteries. Under EPR policies, producers of materials (e.g., batteries) pay the cost to collect and recycle.
- Explore opportunities to improve waste collection route optimization.
- Expand types of material that are accepted in the mixed comingled recycling stream.
- Establish programs that discourage the use of single-use plastics, such as plastic bags.

Quality of Life

- Plan for safe, affordable, accessible housing to meet the needs of all Lexington residents.
- Enable all existing and new neighborhoods to flourish through thoughtful (re)development. This includes connectivity to other neighborhoods and key businesses/services, safe biking, scooting and walking options, natural features, green infrastructure, neighborhood-level services and businesses and other assets. Emphasis should be placed on keeping current residents in place.
- Ensure equitable development and rectify Lexington's segregation by race and socioeconomic status.
- Strengthen efforts to develop a variety of job opportunities that support a living wage and lead to prosperity for all.
- Enhance job training and career connection opportunities for all residents seeking better economic options.
- Improve opportunities for small business development with focused support for minority businesses.
- Create opportunities for low-, moderate- and middle- income residents to access affordable and equitable home financing options for those who desire to own a home.
- Enhance opportunities for robust public outreach and engagement, particularly for issues that affect quality of life.

Regional Climate Action Plan Input Opportunity

Thursday, Feb. 8, 2024

Share

Bourbon, Clark, Fayette, Jessamine, Scott and Woodford Counties, along with the municipal governments within those counties, are collaborating on a regional climate action plan. The six-county collaborative is seeking public input on the priority projects proposed to reduce greenhouse gas emissions (GHG) in the region.

To collect input, a hybrid meeting will take place on Thursday, Feb. 15, from 5:30 – 6:30 p.m., Fayette County will serve as the primary meeting host, with the event taking place at the Senior Center, 195 Life Lane. Each participating community will have a public meeting hub, with an onsite facilitator. Individuals are also welcome to log into the meeting directly via Zoom .

On Feb. 16, a survey will be made available online for those who were unable to attend or who have additional thoughts to share. The survey will remain open until 11:59 p.m. on Monday, February 19.

To access the public meeting via Zoom, find the meeting location for other communities or (starting Feb. 16) take the public input survey on our Sustainability page.

This regional effort is funded by a grant from the Environmental Protection Agency (EPA). Input from the public meeting and survey will inform what goes into the regional implementation grant application, which would be used to fund the GHG reduction projects.

Proposed projects focus on solar energy, trees, and transportation. These proposals build on existing efforts that have a proven track record.

###

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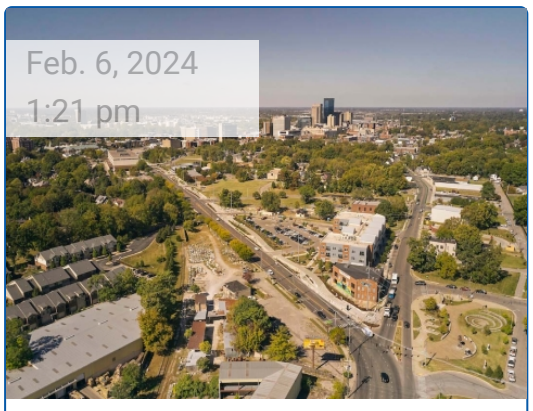

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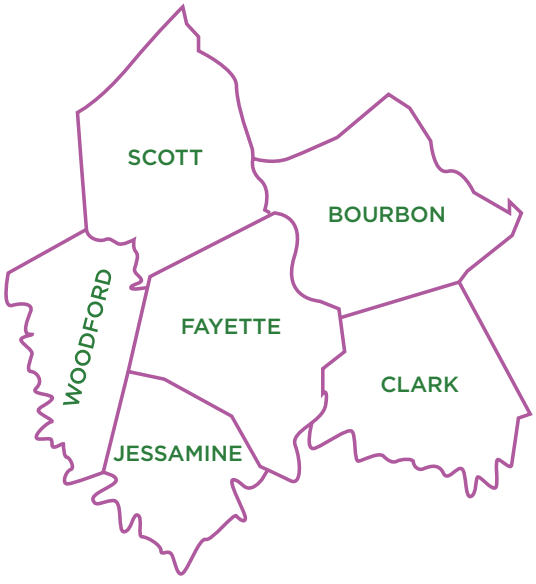
Feedback

Regional Sustainability Plan

Public Meeting

Thursday, Feb. 15
5:30 – 6:30 p.m.



SIX-COUNTY AREA

Fayette County Meeting

Participate in-person or virtually.

In-person: Senior Center, 195 Life Lane

Virtually: LexingtonKY.gov/Sustainability

Regional Sustainability Plan

Public Meeting

Thursday, Feb. 15
5:30 – 6:30 p.m.

Fayette County Meeting

Participate in-person or virtually:

In-person: Senior Center, 195 Life Lane

Virtually: LexingtonKY.gov/Sustainability

Regional Sustainability Plan Community Engagement

Feb. 15, 2024, 5:30pm-6:30pm

Notes:

- Ask Zoom individual participants to login with their first name and community.
- Ask hubs to log in as <community> hub.
- Have two people running the webinar section. One will focus on the Zoom individuals, the other will focus on the hubs. There will need to be an in-person facilitator for Lexington as well.
- Suggest that each hub have large post-its and markers to write notes from the discussion.
- Suggest each hub have two people: One to facilitate/talk. One to take notes and communicate via Zoom to the Lexington hosts.

Welcome: 5 minutes

Facilitator script:

Thank you for joining us for this regional input session. The meeting involves folks from Bourbon, Clark, Fayette, Jessamine, Scott and Woodford counties and the communities / cities within. To give as many people as possible the opportunity to participate, the meeting is being held in-person at hubs throughout the region with the session being directed from a site in Lexington. Individuals were also able to log into the meeting directly via Zoom.

This meeting is part of a planning process funded by a grant from the Environmental Protection Agency. The outcome of this process is a plan with specific projects that will make meaningful headway on reducing regional greenhouse gas emissions. The next step is applying for grant funding to implement the projects. There will be additional opportunities for input during the comprehensive plan development, and implementation planning if the next grant is awarded.

The proposed projects you will hear about this evening are inspired by successful programs that already exist in other communities. The discussion will largely focus on how these efforts can be expanded regionally and modified to make them appropriate for each community included in the grant. For the Priority Climate Action Plan, building on existing success will allow us to get the best results efficiently – from both a time and money standpoint. Over the next two years, the region will expand the priority plan into a Comprehensive Climate Action Plan.

We have an hour scheduled and will get through as much information and discussion as we can in that time. We'll start with a presentation about the current grant and process with an introduction to each of the proposed projects. Once the formal presentation is over, there will be time for each hub to engage in discussion on the projects. Zoom participants will have their own discussion group with a separate facilitator.

If ideas come to you after tonight's meeting or if you are aware of friends, family, co-workers, neighbors or others who would like to provide input, a survey will be made available tomorrow through Monday, February 19 on LexingtonKY.gov/Sustainability.

<Presentation>: 20 minutes

Discussion: 20-25 minutes

Instructions for facilitator:

1. Make sure sound is off – both so you aren't prematurely being heard by everyone on Zoom and so that you aren't hearing what those in the Zoom discussion are saying.
2. Record the discussion at your hub on a phone and send the audio file to the coordinators after the meeting.
3. Convey questions and comments for each section via Zoom as they occur so they can be addressed or at least acknowledged. Sharing them real-time will help the main coordinators better consolidate like comments and questions, allowing them to be addressed more efficiently.
4. Provide a written summary of the comments (bullets are fine) and share with the coordinators after the meeting,

Script for facilitators:

We'll address each of the proposed projects individually. Once we make it through each of the project areas, we'll have some time for discussion on overall comments and questions. Our discussion is being recorded so it can go in the meeting record, along with the recorded Zoom. Comments and questions will be sent back to the meeting coordinators who will address as many as they can this evening.

Let's start with the **Solarize** initiatives.

- What community concerns or questions about solar, in general, or this program, in particular, should be addressed upfront?

<pause for discussion>

- How would you suggest we best communicate such a program to homeowners, places of worship, businesses and organizations and others who quality? How do we specifically reach low-to-moderate-income homeowners about the grant program, assuming it is funded?

<pause for discussion>

- Lexington's Solarize effort experienced scammers who went door-to-door pretending they were affiliated with the program. Do you have any ideas about how to counter this problem in your community?

<pause for discussion>

Now let's discuss the proposal to **plant more trees** in the region.

- What community concerns or questions about expanding and protecting the tree canopy should be addressed up front?

<pause for discussion>

- Do you feel that a community planting at a public site or planting on individual properties would be most well-received? Or, both? Why?

<pause for discussion>

    - For community plantings: Ideas on locations?

- For individual properties: What would be the best ways to share information on proper tree selection and planting? Please share your thoughts on how to best:
    - Distribute trees?
    - Ensure they get in the ground?
    - Support ongoing maintenance?

<pause for discussion>

Let's talk about the proposed **Lextran Solar Canopy and Charging Infrastructure Project.**

- A lot of the discussion during the residential solar measure may apply to this project as well. What other community questions or concerns about the project should be addressed upfront?

  <pause for discussion>

- What are the current community perceptions on electric public transportation?

- <pause for discussion>

Let's talk about the proposed **regional study for EV charging**.

- What community questions or concerns about EV charging stations should be addressed upfront?

  <pause for discussion>

- What are the current community perceptions on regional charging stations?

<pause for discussion>

Before we rejoin the group, let's discuss some **bigger picture topics**.

- Who should be at the table that isn't?

<pause for discussion>

- Do you feel there are GHG reduction projects that are suitable for the region that have been left out of the discussion?

<pause for discussion>

Reconvening: 10-15 minutes

Facilitator script:

At this point, we'll rejoin the other groups. Folks from the core team will address as many of the comments and questions as they can in the time remaining. All comments and questions will be taken into consideration as the team works on the next grant application. You can visit

LexingtonKY.gov/Sustainability to check-up on the status of the process. That website is also where the input survey will be posted if you or others want to share additional thoughts between now and the end of the day on Monday, February 19.

Facilitator instructions:

1. Make sure all your major comments/questions have been submitted.
2. Ensure that your hub is muted and you can hear the Lexington feed.

Appendix E – LIDAC Analysis

Low-Income Communities

Census Tract 2010 ID	County Name	State/Territory
21017030100	Bourbon County	Kentucky
21017030200	Bourbon County	Kentucky
21017030500	Bourbon County	Kentucky
21017030600	Bourbon County	Kentucky
21049020106	Clark County	Kentucky
21049020201	Clark County	Kentucky
21049020202	Clark County	Kentucky
21067000101	Fayette County	Kentucky
21067000102	Fayette County	Kentucky
21067000200	Fayette County	Kentucky
21067000300	Fayette County	Kentucky
21067000400	Fayette County	Kentucky
21067001000	Fayette County	Kentucky
21067001100	Fayette County	Kentucky
21067001300	Fayette County	Kentucky
21067001400	Fayette County	Kentucky
21067001500	Fayette County	Kentucky
21067001600	Fayette County	Kentucky
21067001900	Fayette County	Kentucky
21067002001	Fayette County	Kentucky
21067002002	Fayette County	Kentucky
21067003000	Fayette County	Kentucky
21067003101	Fayette County	Kentucky
21067003102	Fayette County	Kentucky
21067003202	Fayette County	Kentucky
21067003300	Fayette County	Kentucky
21067003402	Fayette County	Kentucky
21067003404	Fayette County	Kentucky
21067003504	Fayette County	Kentucky
21067003804	Fayette County	Kentucky
21067003910	Fayette County	Kentucky
21067003911	Fayette County	Kentucky
21067004001	Fayette County	Kentucky
21067004104	Fayette County	Kentucky
21113060101	Jessamine County	Kentucky
21113060102	Jessamine County	Kentucky
21113060503	Jessamine County	Kentucky
21113060504	Jessamine County	Kentucky
21209040100	Scott County	Kentucky
21209040205	Scott County	Kentucky
21239050103	Woodford County	Kentucky

Source: Climate and Economic Justice Screening Tool

Disadvantaged Communities

Census Tract 2010 ID	County Name	State/Territory
21017030100	Bourbon County	Kentucky
21017030500	Bourbon County	Kentucky
21017030600	Bourbon County	Kentucky
21049020106	Clark County	Kentucky
21049020201	Clark County	Kentucky
21049020202	Clark County	Kentucky
21067000101	Fayette County	Kentucky
21067000102	Fayette County	Kentucky
21067000200	Fayette County	Kentucky
21067000300	Fayette County	Kentucky
21067000400	Fayette County	Kentucky
21067000801	Fayette County	Kentucky
21067000900	Fayette County	Kentucky
21067001000	Fayette County	Kentucky
21067001100	Fayette County	Kentucky
21067001300	Fayette County	Kentucky
21067001400	Fayette County	Kentucky
21067001500	Fayette County	Kentucky
21067001600	Fayette County	Kentucky
21067001900	Fayette County	Kentucky
21067002001	Fayette County	Kentucky
21067002002	Fayette County	Kentucky
21067003000	Fayette County	Kentucky
21067003101	Fayette County	Kentucky
21067003102	Fayette County	Kentucky
21067003404	Fayette County	Kentucky
21067003504	Fayette County	Kentucky
21067003910	Fayette County	Kentucky
21067004104	Fayette County	Kentucky
21113060102	Jessamine County	Kentucky
21113060503	Jessamine County	Kentucky
21113060504	Jessamine County	Kentucky
21209040100	Scott County	Kentucky

Source: Climate and Economic Justice Screening Tool

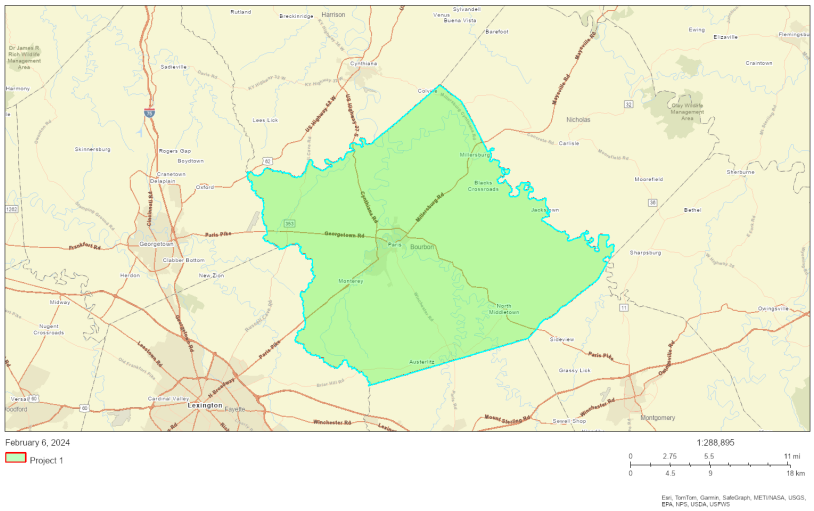
EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Bourbon County, KY

County: Bourbon
Population: 20,281
Area in square miles: 291.61

A3 Landscape



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	93%
Spanish	5%
French, Haitian, or Cajun	1%
Total Non-English	7%

COMMUNITY INFORMATION

- Low income: 33 percent
- People of color: 15 percent
- Less than high school education: 14 percent
- Limited English households: 0 percent
- Unemployment: 5 percent
- Persons with disabilities: 19 percent
- Male: 50 percent
- Female: 50 percent
- 76 years — Average life expectancy
- $29,783 — Per capita income
- Number of households: 8,135
- Owner occupied: 64 percent

BREAKDOWN BY RACE

- White: 85%
- Black: 5%
- American Indian: 0%
- Asian: 0%
- Hawaiian/Pacific Islander: 0%
- Other race: 0%
- Two or more races: 3%
- Hispanic: 7%

BREAKDOWN BY AGE

From Ages 1 to 4	6%
From Ages 1 to 18	23%
From Ages 18 and up	77%
From Ages 65 and up	19%

LIMITED ENGLISH SPEAKING BREAKDOWN

Speak Spanish	78%
Speak Other Indo-European Languages	22%
Speak Asian-Pacific Island Languages	0%
Speak Other Languages	0%

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2017 -2021. Life expectancy data comes from the Centers for Disease Control.

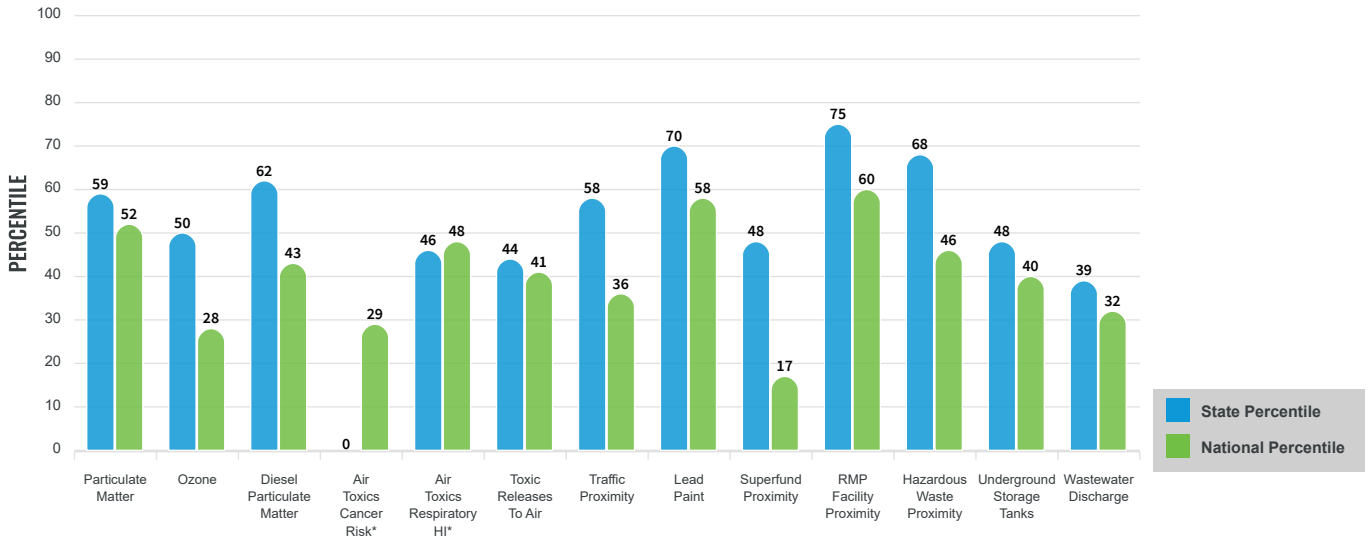
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

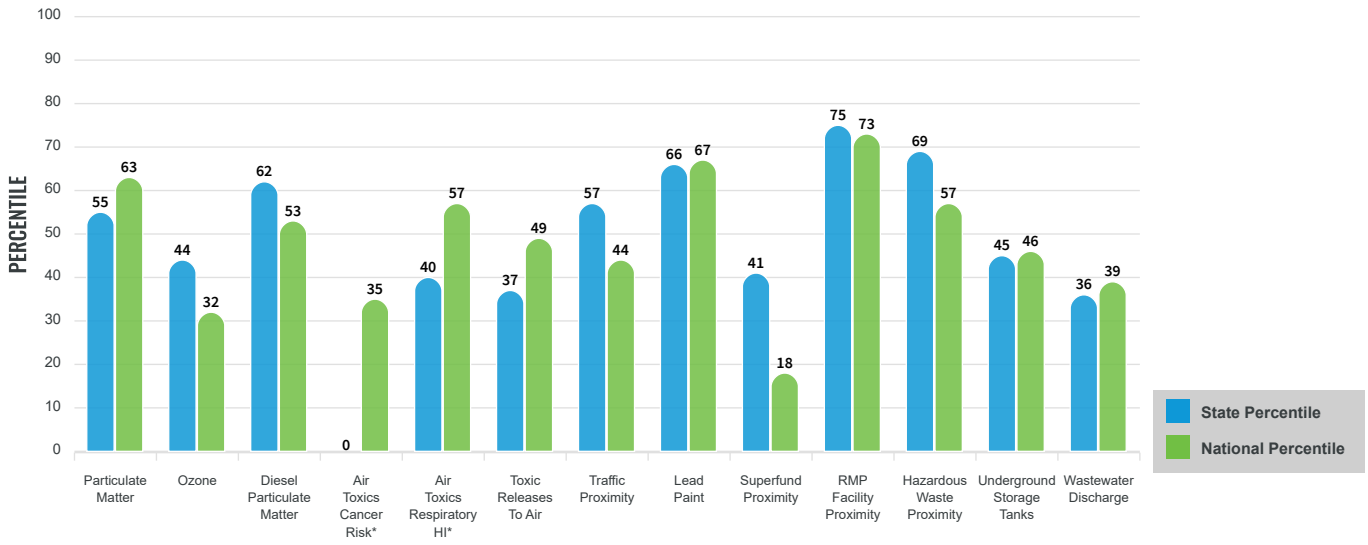
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected block group or buffer area compares to the entire state or nation.

Report for County: Bourbon

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter (µg/m^3)	8.31	8.54	44	8.08	53
Ozone (ppb)	57.8	59.3	39	61.6	23
Diesel Particulate Matter (µg/m^3)	0.175	0.203	51	0.261	38
Air Toxics Cancer Risk* (lifetime risk per million)	20	26	0	25	5
Air Toxics Respiratory HI*	0.3	0.32	2	0.31	31
Toxic Releases to Air	400	7,500	34	4,600	43
Traffic Proximity (daily traffic count/distance to road)	40	78	56	210	36
Lead Paint (% Pre-1960 Housing)	0.31	0.24	72	0.3	59
Superfund Proximity (site count/km distance)	0.017	0.039	37	0.13	13
RMP Facility Proximity (facility count/km distance)	0.89	0.33	90	0.43	86
Hazardous Waste Proximity (facility count/km distance)	0.49	0.78	66	1.9	49
Underground Storage Tanks (count/km^2)	0.99	1.1	64	3.9	47
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.00018	0.48	40	22	34
SOCIOECONOMIC INDICATORS					
Demographic Index	24%	26%	52	35%	41
Supplemental Demographic Index	15%	16%	47	14%	60
People of Color	15%	16%	66	39%	31
Low Income	33%	37%	45	31%	60
Unemployment Rate	5%	6%	59	6%	59
Limited English Speaking Households	0%	1%	80	5%	57
Less Than High School Education	14%	13%	61	12%	70
Under Age 5	6%	6%	57	6%	59
Over Age 64	19%	17%	61	17%	62
Low Life Expectancy	19%	22%	16	20%	46

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	2
Water Dischargers	90
Air Pollution	8
Brownfields	1
Toxic Release Inventory	6

Other community features within defined area:

Schools	10
Hospitals	1
Places of Worship	6

Other environmental data:

Air Non-attainment	No
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for County: Bourbon

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	19%	22%	16	20%	46
Heart Disease	8	7.4	56	6.1	83
Asthma	11.5	11.5	50	10	85
Cancer	7	6.5	68	6.1	69
Persons with Disabilities	18.4%	18.3%	52	13.4%	81

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	9%	12%	59	12%	63
Wildfire Risk	0%	3%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	18%	17%	57	14%	70
Lack of Health Insurance	4%	6%	36	9%	26
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Report for County: Bourbon

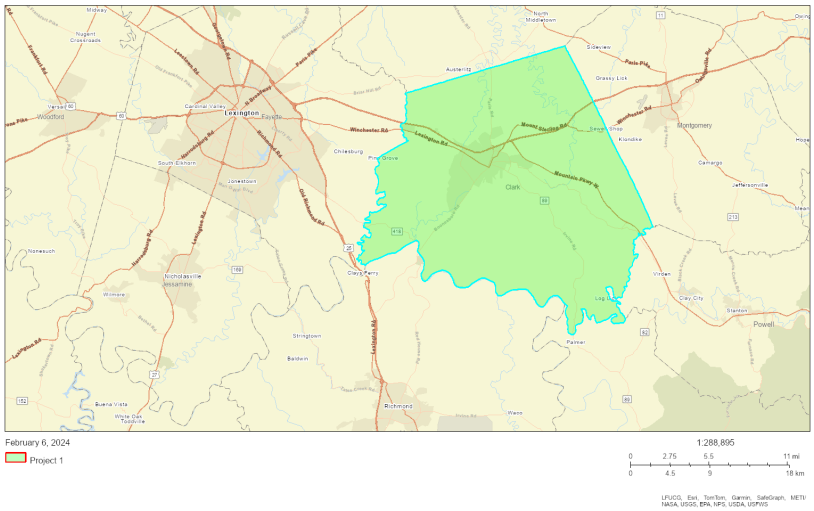
EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Clark County, KY

County: Clark
Population: 36,716
Area in square miles: 255.15

A3 Landscape



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	97%
Spanish	2%
Total Non-English	3%

COMMUNITY INFORMATION

- Low income: 32 percent
- People of color: 11 percent
- Less than high school education: 11 percent
- Limited English households: 1 percent
- Unemployment: 5 percent
- Persons with disabilities: 20 percent
- Male: 49 percent
- Female: 51 percent
- 76 years — Average life expectancy
- $33,205 — Per capita income
- Number of households: 14,836
- Owner occupied: 72 percent

BREAKDOWN BY RACE

- White: 89%
- Black: 4%
- American Indian: 0%
- Asian: 1%
- Hawaiian/Pacific Islander: 0%
- Other race: 0%
- Two or more races: 2%
- Hispanic: 3%

BREAKDOWN BY AGE

From Ages 1 to 4	6%
From Ages 1 to 18	22%
From Ages 18 and up	78%
From Ages 65 and up	18%

LIMITED ENGLISH SPEAKING BREAKDOWN

Speak Spanish	91%
Speak Other Indo-European Languages	9%
Speak Asian-Pacific Island Languages	0%
Speak Other Languages	0%

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2017 -2021. Life expectancy data comes from the Centers for Disease Control.

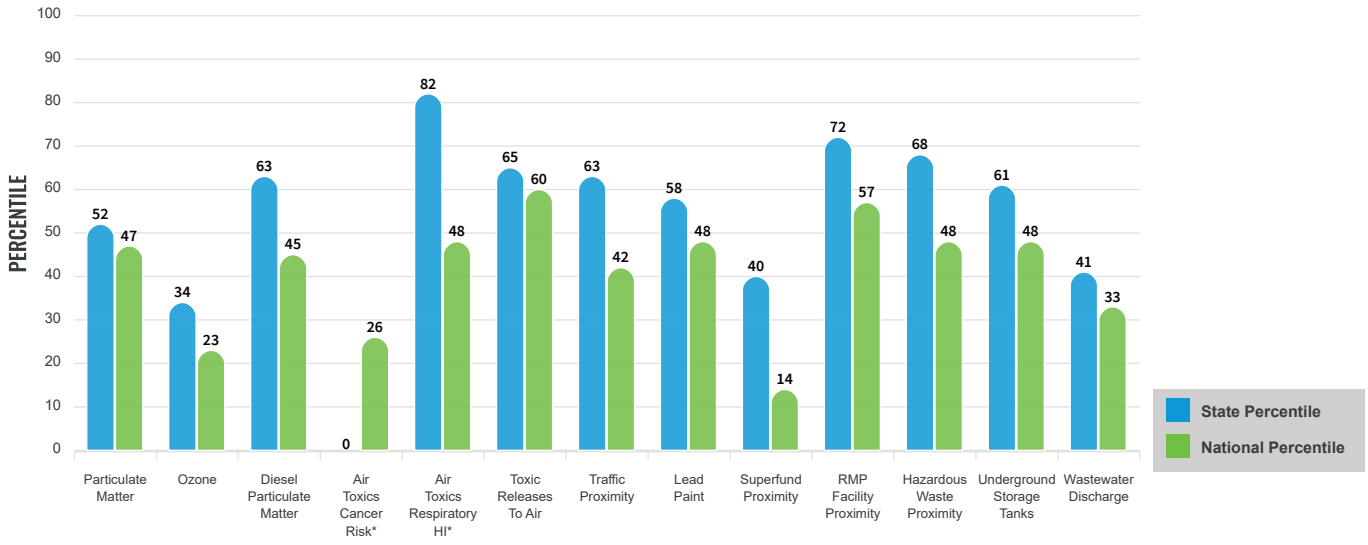
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

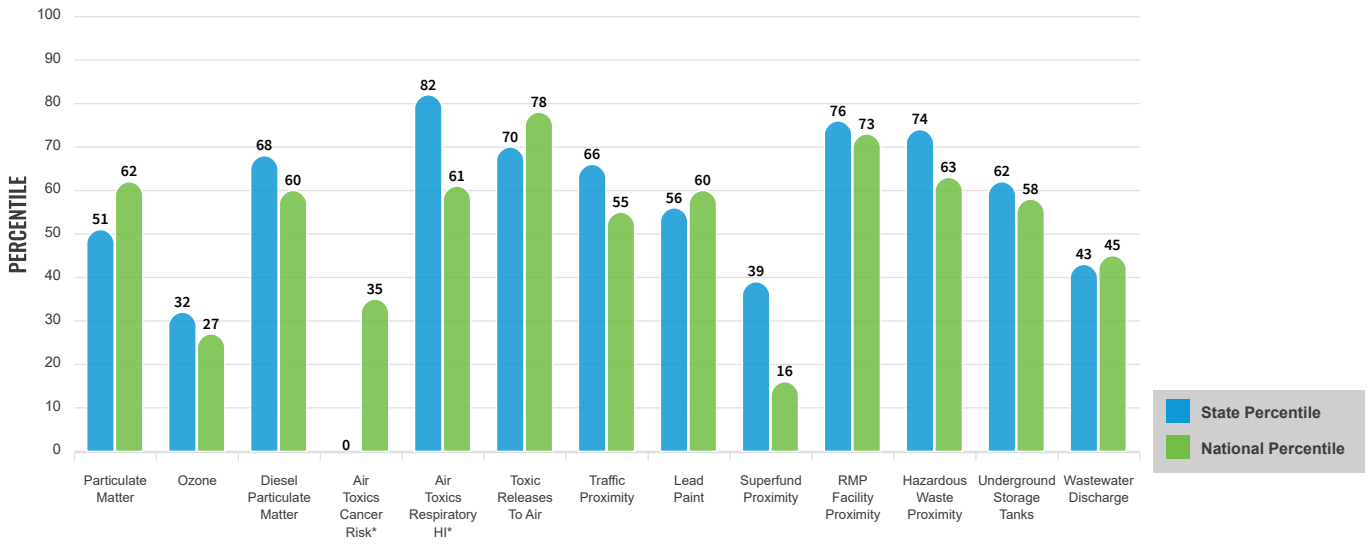
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected block group or buffer area compares to the entire state or nation.

Report for County: Clark

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter (µg/m^3)	8.24	8.54	42	8.08	51
Ozone (ppb)	57.4	59.3	29	61.6	20
Diesel Particulate Matter (µg/m^3)	0.193	0.203	56	0.261	43
Air Toxics Cancer Risk* (lifetime risk per million)	20	26	0	25	5
Air Toxics Respiratory HI*	0.31	0.32	2	0.31	31
Toxic Releases to Air	2,500	7,500	63	4,600	76
Traffic Proximity (daily traffic count/distance to road)	68	78	68	210	47
Lead Paint (% Pre-1960 Housing)	0.23	0.24	61	0.3	51
Superfund Proximity (site count/km distance)	0.016	0.039	35	0.13	12
RMP Facility Proximity (facility count/km distance)	0.5	0.33	82	0.43	76
Hazardous Waste Proximity (facility count/km distance)	0.7	0.78	72	1.9	55
Underground Storage Tanks (count/km^2)	1.4	1.1	71	3.9	53
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.0025	0.48	63	22	56
SOCIOECONOMIC INDICATORS					
Demographic Index	21%	26%	43	35%	35
Supplemental Demographic Index	15%	16%	45	14%	59
People of Color	11%	16%	55	39%	24
Low Income	32%	37%	43	31%	58
Unemployment Rate	5%	6%	56	6%	55
Limited English Speaking Households	1%	1%	82	5%	59
Less Than High School Education	11%	13%	49	12%	60
Under Age 5	6%	6%	62	6%	63
Over Age 64	18%	17%	57	17%	59
Low Life Expectancy	24%	22%	62	20%	84

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund 0
Hazardous Waste, Treatment, Storage, and Disposal Facilities 3
Water Dischargers 188
Air Pollution 14
Brownfields 1
Toxic Release Inventory 23

Other community features within defined area:

Schools 10
Hospitals 1
Places of Worship 34

Other environmental data:

Air Non-attainment ..... No
Impaired Waters ..... Yes

Selected location contains American Indian Reservation Lands* ..... No
Selected location contains a "Justice40 (CEJST)" disadvantaged community ..... Yes
Selected location contains an EPA IRA disadvantaged community ..... Yes

Report for County: Clark

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	24%	22%	62	20%	84
Heart Disease	7.5	7.4	50	6.1	77
Asthma	11.3	11.5	42	10	82
Cancer	6.8	6.5	53	6.1	62
Persons with Disabilities	18.5%	18.3%	53	13.4%	81

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	11%	12%	66	12%	68
Wildfire Risk	0%	3%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	15%	17%	47	14%	62
Lack of Health Insurance	5%	6%	44	9%	33
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Report for County: Clark

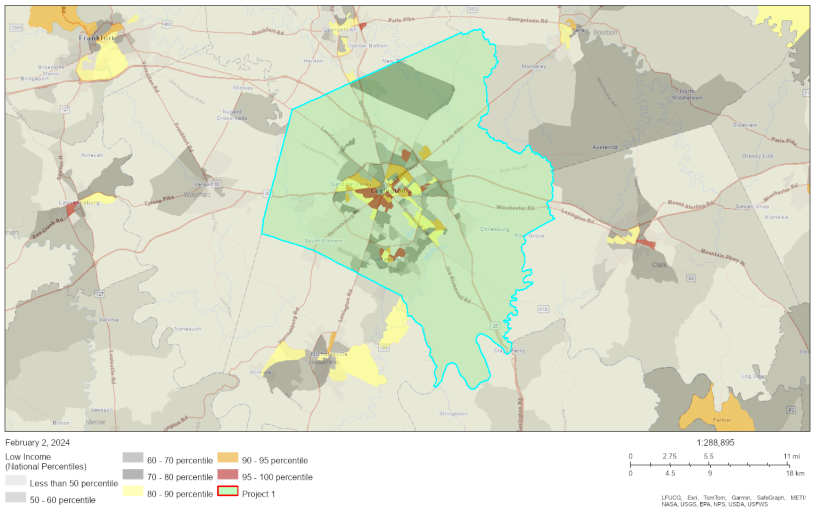
EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Lexington-Fayette, KY

City: Lexington-Fayette
Population: 321,354
Area in square miles: 285.54

A3 Landscape



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	87%
Spanish	6%
French, Haitian, or Cajun	1%
Other Indo-European	2%
Chinese (including Mandarin, Cantonese)	1%
Other Asian and Pacific Island	1%
Arabic	1%
Other and Unspecified	1%
Total Non-English	13%

COMMUNITY INFORMATION

- Low income: 33 percent
- People of color: 30 percent
- Less than high school education: 8 percent
- Limited English households: 3 percent
- Unemployment: 5 percent
- Persons with disabilities: 13 percent
- Male: 49 percent
- Female: 51 percent
- 70 years — Average life expectancy
- $38,043 — Per capita income
- Number of households: 134,229
- Owner occupied: 54 percent

BREAKDOWN BY RACE

- White: 70%
- Black: 14%
- American Indian: 0%
- Asian: 4%
- Hawaiian/Pacific Islander: 0%
- Other race: 0%
- Two or more races: 4%
- Hispanic: 7%

BREAKDOWN BY AGE

From Ages 1 to 4	6%
From Ages 1 to 18	21%
From Ages 18 and up	79%
From Ages 65 and up	13%

LIMITED ENGLISH SPEAKING BREAKDOWN

Speak Spanish	45%
Speak Other Indo-European Languages	15%
Speak Asian-Pacific Island Languages	29%
Speak Other Languages	11%

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2017 -2021. Life expectancy data comes from the Centers for Disease Control.

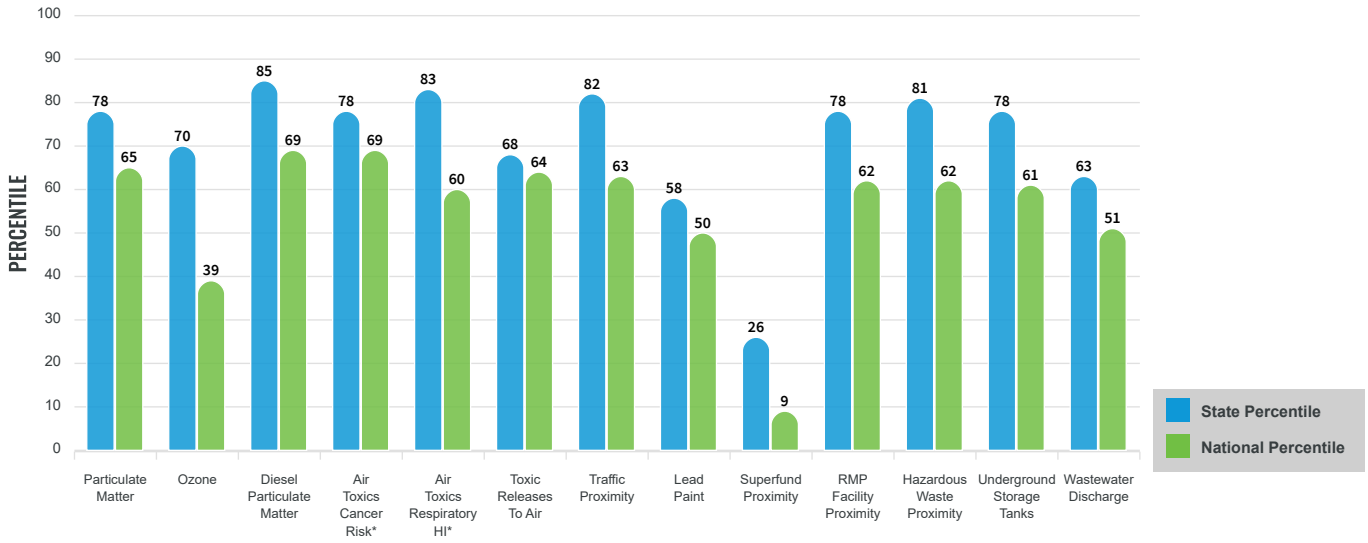
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

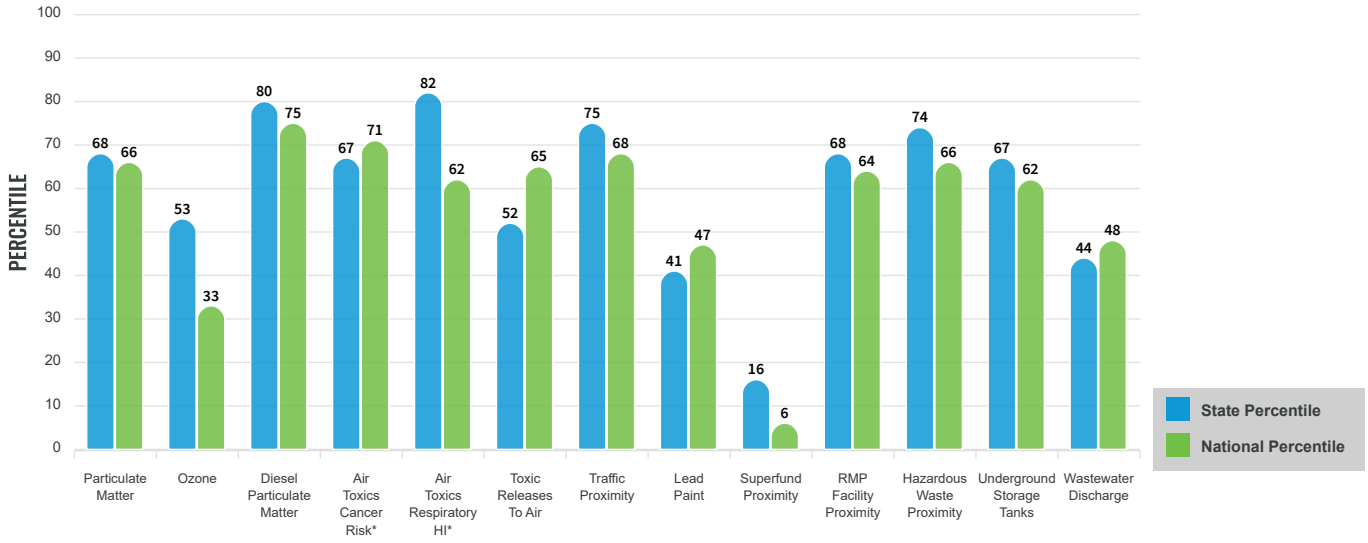
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected block group or buffer area compares to the entire state or nation.

Report for City: Lexington-Fayette

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter (µg/m^3)	8.55	8.54	57	8.08	59
Ozone (ppb)	58.2	59.3	48	61.6	26
Diesel Particulate Matter (µg/m^3)	0.326	0.203	84	0.261	73
Air Toxics Cancer Risk* (lifetime risk per million)	29	26	0	25	5
Air Toxics Respiratory HI*	0.31	0.32	2	0.31	31
Toxic Releases to Air	1,200	7,500	49	4,600	63
Traffic Proximity (daily traffic count/distance to road)	160	78	87	210	69
Lead Paint (% Pre-1960 Housing)	0.19	0.24	53	0.3	47
Superfund Proximity (site count/km distance)	0.012	0.039	16	0.13	6
RMP Facility Proximity (facility count/km distance)	0.31	0.33	74	0.43	68
Hazardous Waste Proximity (facility count/km distance)	1.1	0.78	80	1.9	63
Underground Storage Tanks (count/km^2)	2.1	1.1	79	3.9	59
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.16	0.48	91	22	84
SOCIOECONOMIC INDICATORS					
Demographic Index	32%	26%	70	35%	53
Supplemental Demographic Index	14%	16%	41	14%	54
People of Color	30%	16%	83	39%	49
Low Income	33%	37%	44	31%	59
Unemployment Rate	5%	6%	58	6%	57
Limited English Speaking Households	3%	1%	87	5%	68
Less Than High School Education	8%	13%	36	12%	48
Under Age 5	6%	6%	58	6%	59
Over Age 64	13%	17%	37	17%	41
Low Life Expectancy	18%	22%	10	20%	33

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund 0
Hazardous Waste, Treatment, Storage, and Disposal Facilities 13
Water Dischargers 1180
Air Pollution 31
Brownfields 17
Toxic Release Inventory 42

Other community features within defined area:

Schools 80
Hospitals 13
Places of Worship 47

Other environmental data:

Air Non-attainment ..... No
Impaired Waters ..... Yes

Selected location contains American Indian Reservation Lands* ..... No
Selected location contains a "Justice40 (CEJST)" disadvantaged community ..... Yes
Selected location contains an EPA IRA disadvantaged community ..... Yes

Report for City: Lexington-Fayette

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	18%	22%	9	20%	33
Heart Disease	5.4	7.4	11	6.1	35
Asthma	10.8	11.5	29	10	75
Cancer	5.4	6.5	15	6.1	33
Persons with Disabilities	12.5%	18.3%	23	13.4%	50

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	6%	12%	35	12%	45
Wildfire Risk	0%	3%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	10%	17%	32	14%	46
Lack of Health Insurance	7%	6%	69	9%	50
Housing Burden	Yes	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Report for City: Lexington-Fayette

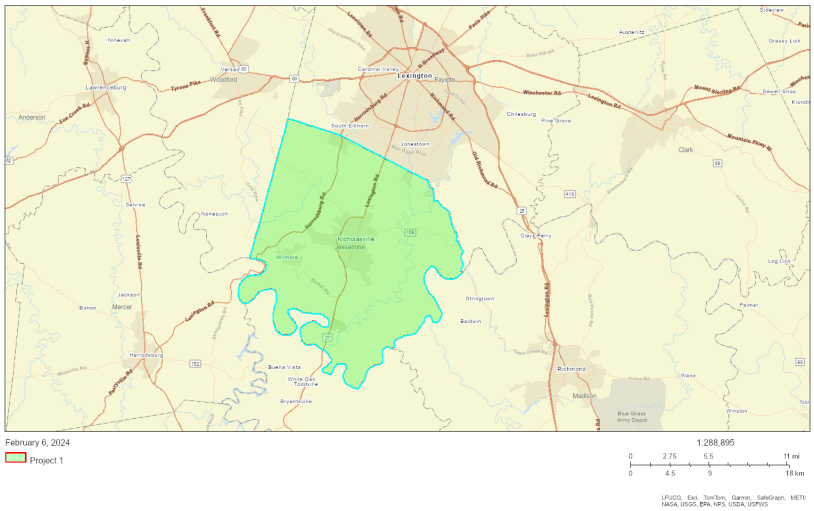
EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Jessamine County, KY

County: Jessamine
Population: 53,016
Area in square miles: 174.53

A3 Landscape



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	93%
Spanish	3%
Russian, Polish, or Other Slavic	2%
Other Asian and Pacific Island	1%
Other and Unspecified	1%
Total Non-English	7%

COMMUNITY INFORMATION

- Low income: 31 percent
- People of color: 12 percent
- Less than high school education: 10 percent
- Limited English households: 1 percent
- Unemployment: 5 percent
- Persons with disabilities: 15 percent
- Male: 49 percent
- Female: 51 percent
- 76 years — Average life expectancy
- $34,148 — Per capita income
- Number of households: 19,054
- Owner occupied: 68 percent

BREAKDOWN BY RACE

- White: 88%
- Black: 4%
- American Indian: 0%
- Asian: 1%
- Hawaiian/Pacific Islander: 0%
- Other race: 0%
- Two or more races: 2%
- Hispanic: 4%

BREAKDOWN BY AGE

From Ages 1 to 4	6%
From Ages 1 to 18	24%
From Ages 18 and up	76%
From Ages 65 and up	15%

LIMITED ENGLISH SPEAKING BREAKDOWN

Speak Spanish	65%
Speak Other Indo-European Languages	13%
Speak Asian-Pacific Island Languages	10%
Speak Other Languages	12%

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2017 -2021. Life expectancy data comes from the Centers for Disease Control.

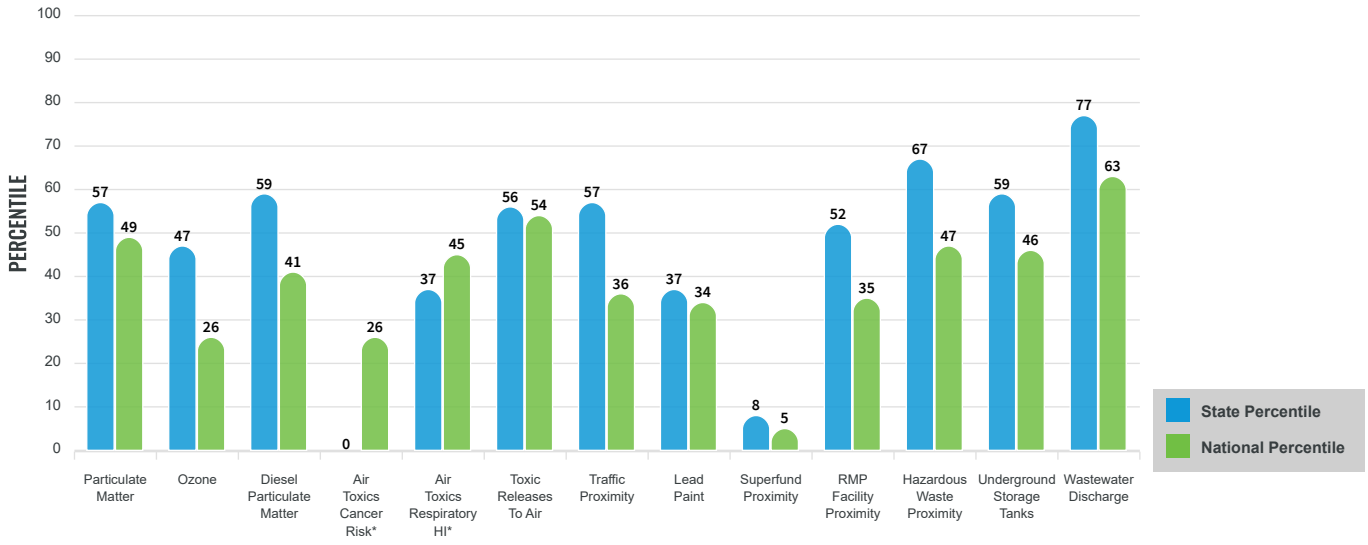
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

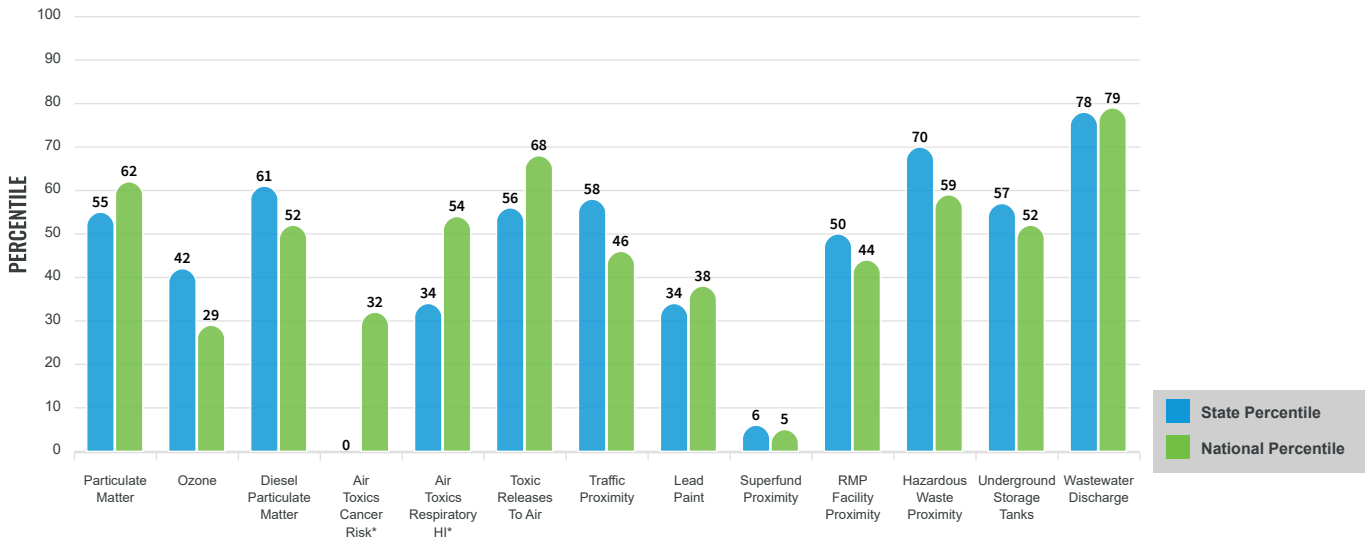
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected block group or buffer area compares to the entire state or nation.

Report for County: Jessamine

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter (µg/m^3)	8.4	8.54	48	8.08	55
Ozone (ppb)	57.9	59.3	41	61.6	23
Diesel Particulate Matter (µg/m^3)	0.181	0.203	53	0.261	40
Air Toxics Cancer Risk* (lifetime risk per million)	20	26	0	25	5
Air Toxics Respiratory HI*	0.3	0.32	2	0.31	31
Toxic Releases to Air	1,200	7,500	50	4,600	63
Traffic Proximity (daily traffic count/distance to road)	49	78	60	210	39
Lead Paint (% Pre-1960 Housing)	0.11	0.24	35	0.3	36
Superfund Proximity (site count/km distance)	0.01	0.039	6	0.13	4
RMP Facility Proximity (facility count/km distance)	0.13	0.33	49	0.43	40
Hazardous Waste Proximity (facility count/km distance)	0.7	0.78	72	1.9	55
Underground Storage Tanks (count/km^2)	1.1	1.1	66	3.9	49
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.32	0.48	94	22	87
SOCIOECONOMIC INDICATORS					
Demographic Index	21%	26%	43	35%	35
Supplemental Demographic Index	13%	16%	39	14%	53
People of Color	12%	16%	59	39%	26
Low Income	31%	37%	41	31%	56
Unemployment Rate	5%	6%	56	6%	55
Limited English Speaking Households	1%	1%	82	5%	59
Less Than High School Education	10%	13%	47	12%	59
Under Age 5	6%	6%	61	6%	62
Over Age 64	15%	17%	45	17%	48
Low Life Expectancy	19%	22%	18	20%	49

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund 0
Hazardous Waste, Treatment, Storage, and Disposal Facilities 2
Water Dischargers 316
Air Pollution 7
Brownfields 0
Toxic Release Inventory 8

Other community features within defined area:

Schools 14
Hospitals 0
Places of Worship 20

Other environmental data:

Air Non-attainment ..... No
Impaired Waters ..... Yes

Selected location contains American Indian Reservation Lands* ..... No
Selected location contains a "Justice40 (CEJST)" disadvantaged community ..... Yes
Selected location contains an EPA IRA disadvantaged community ..... Yes

Report for County: Jessamine

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	19%	22%	18	20%	49
Heart Disease	6.5	7.4	27	6.1	58
Asthma	11.1	11.5	35	10	79
Cancer	6.1	6.5	26	6.1	45
Persons with Disabilities	13.9%	18.3%	31	13.4%	59

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	7%	12%	48	12%	55
Wildfire Risk	0%	3%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	13%	17%	41	14%	57
Lack of Health Insurance	6%	6%	63	9%	46
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Report for County: Jessamine

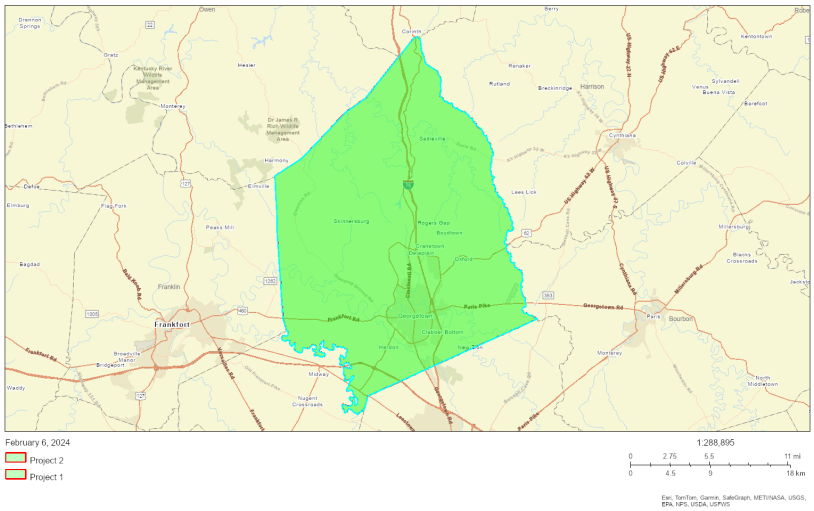
EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Scott County, KY

County: Scott
Population: 56,267
Area in square miles: 285.41

A3 Landscape



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	96%
Spanish	3%
Total Non-English	4%

COMMUNITY INFORMATION

- Low income: 22 percent
- People of color: 13 percent
- Less than high school education: 6 percent
- Limited English households: 1 percent
- Unemployment: 3 percent
- Persons with disabilities: 14 percent
- Male: 49 percent
- Female: 51 percent
- 76 years — Average life expectancy
- $34,912 — Per capita income
- Number of households: 21,347
- Owner occupied: 72 percent

BREAKDOWN BY RACE

- White: 87%
- Black: 5%
- American Indian: 0%
- Asian: 1%
- Hawaiian/Pacific Islander: 0%
- Other race: 0%
- Two or more races: 3%
- Hispanic: 4%

BREAKDOWN BY AGE

From Ages 1 to 4	6%
From Ages 1 to 18	25%
From Ages 18 and up	75%
From Ages 65 and up	12%

LIMITED ENGLISH SPEAKING BREAKDOWN

Speak Spanish	65%
Speak Other Indo-European Languages	6%
Speak Asian-Pacific Island Languages	29%
Speak Other Languages	0%

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2017 -2021. Life expectancy data comes from the Centers for Disease Control.

Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

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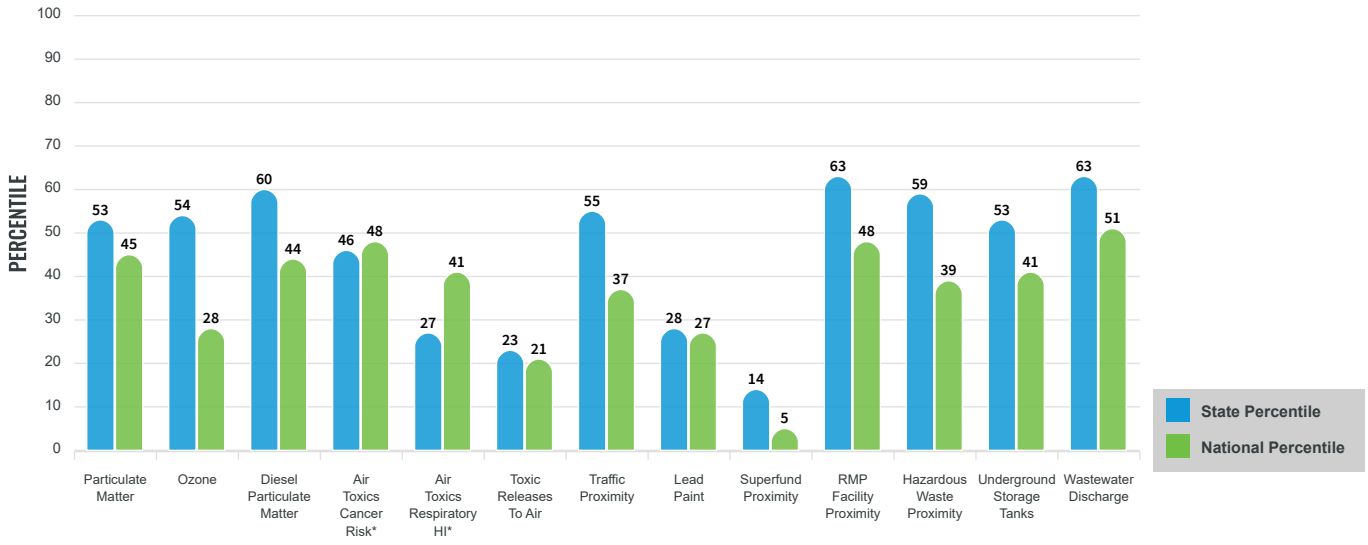
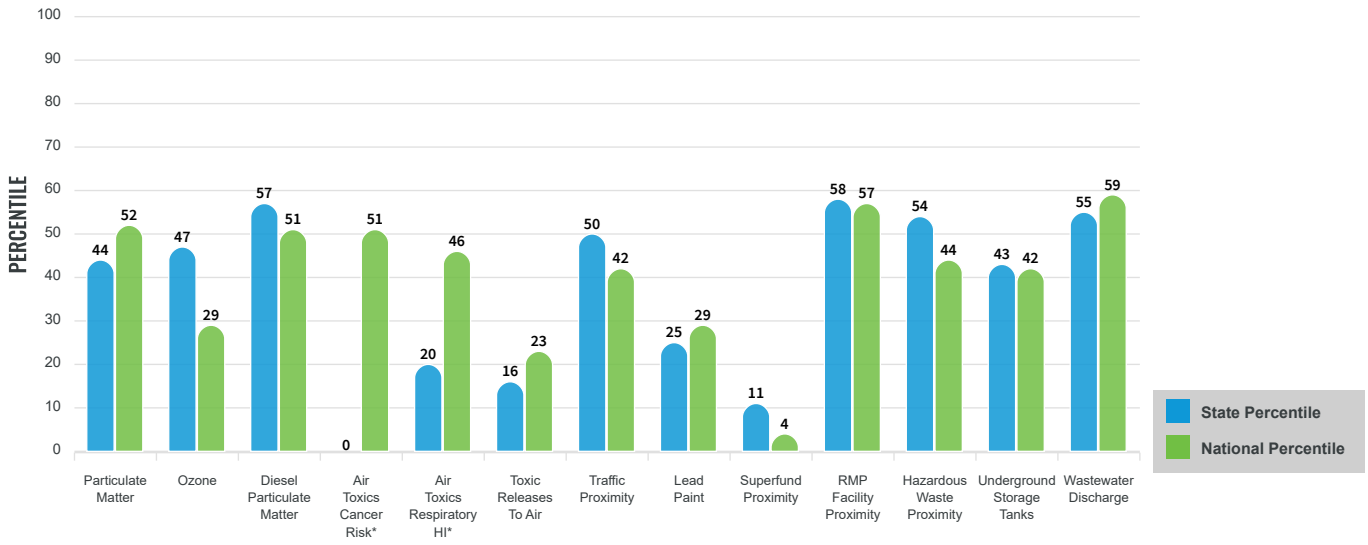
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected block group or buffer area compares to the entire state or nation.

Report for County: Scott

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter (µg/m^3)	8.48	8.54	51	8.08	57
Ozone (ppb)	58.9	59.3	59	61.6	31
Diesel Particulate Matter (µg/m^3)	0.225	0.203	63	0.261	52
Air Toxics Cancer Risk* (lifetime risk per million)	22	26	0	25	5
Air Toxics Respiratory HI*	0.3	0.32	2	0.31	31
Toxic Releases to Air	100	7,500	22	4,600	24
Traffic Proximity (daily traffic count/distance to road)	69	78	68	210	47
Lead Paint (% Pre-1960 Housing)	0.12	0.24	37	0.3	37
Superfund Proximity (site count/km distance)	0.011	0.039	13	0.13	5
RMP Facility Proximity (facility count/km distance)	0.37	0.33	77	0.43	71
Hazardous Waste Proximity (facility count/km distance)	0.46	0.78	65	1.9	48
Underground Storage Tanks (count/km^2)	1.1	1.1	65	3.9	48
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.71	0.48	96	22	90
SOCIOECONOMIC INDICATORS					
Demographic Index	18%	26%	31	35%	27
Supplemental Demographic Index	10%	16%	22	14%	35
People of Color	13%	16%	62	39%	28
Low Income	22%	37%	27	31%	41
Unemployment Rate	3%	6%	47	6%	44
Limited English Speaking Households	1%	1%	81	5%	58
Less Than High School Education	6%	13%	31	12%	43
Under Age 5	6%	6%	62	6%	64
Over Age 64	12%	17%	31	17%	36
Low Life Expectancy	17%	22%	7	20%	23

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund 0
Hazardous Waste, Treatment, Storage, and Disposal Facilities 2
Water Dischargers 296
Air Pollution 13
Brownfields 4
Toxic Release Inventory 13

Other community features within defined area:

Schools 18
Hospitals 1
Places of Worship 10

Other environmental data:

Air Non-attainment ..... No
Impaired Waters ..... Yes

Selected location contains American Indian Reservation Lands* ..... No
Selected location contains a "Justice40 (CEJST)" disadvantaged community ..... Yes
Selected location contains an EPA IRA disadvantaged community ..... Yes

Report for County: Scott

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	17%	22%	6	20%	23
Heart Disease	5.3	7.4	11	6.1	35
Asthma	10.7	11.5	26	10	73
Cancer	5.5	6.5	17	6.1	35
Persons with Disabilities	13.4%	18.3%	27	13.4%	55

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	10%	12%	62	12%	65
Wildfire Risk	0%	3%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	11%	17%	35	14%	49
Lack of Health Insurance	5%	6%	49	9%	36
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Report for County: Scott

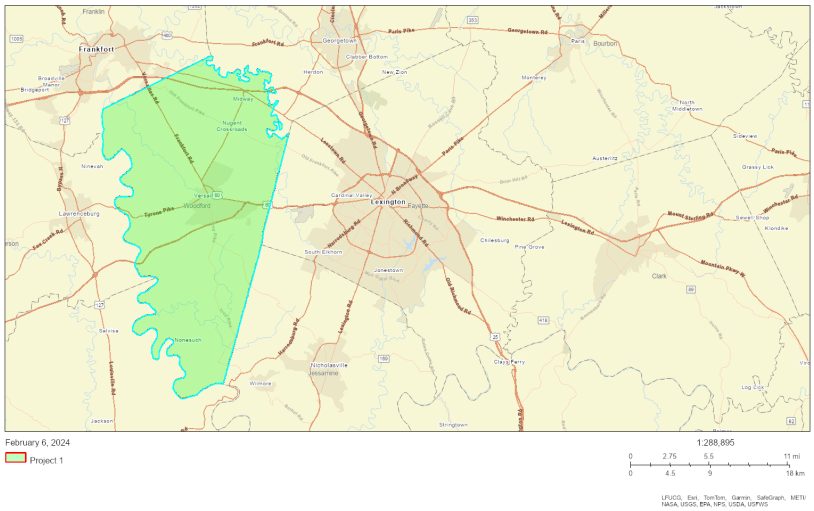
EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Woodford County, KY

County: Woodford
Population: 26,758
Area in square miles: 192.02

A3 Landscape



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	94%
Spanish	5%
Total Non-English	6%

COMMUNITY INFORMATION

- Low income: 22 percent
- People of color: 14 percent
- Less than high school education: 8 percent
- Limited English households: 2 percent
- Unemployment: 3 percent
- Persons with disabilities: 14 percent
- Male: 47 percent
- Female: 53 percent
- 76 years — Average life expectancy
- $35,150 — Per capita income
- Number of households: 10,395
- Owner occupied: 70 percent

BREAKDOWN BY RACE

- White: 86%
- Black: 4%
- American Indian: 0%
- Asian: 0%
- Hawaiian/Pacific Islander: 0%
- Other race: 0%
- Two or more races: 3%
- Hispanic: 7%

BREAKDOWN BY AGE

From Ages 1 to 4	6%
From Ages 1 to 18	22%
From Ages 18 and up	78%
From Ages 65 and up	19%

LIMITED ENGLISH SPEAKING BREAKDOWN

Speak Spanish	92%
Speak Other Indo-European Languages	0%
Speak Asian-Pacific Island Languages	8%
Speak Other Languages	0%

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2017 -2021. Life expectancy data comes from the Centers for Disease Control.

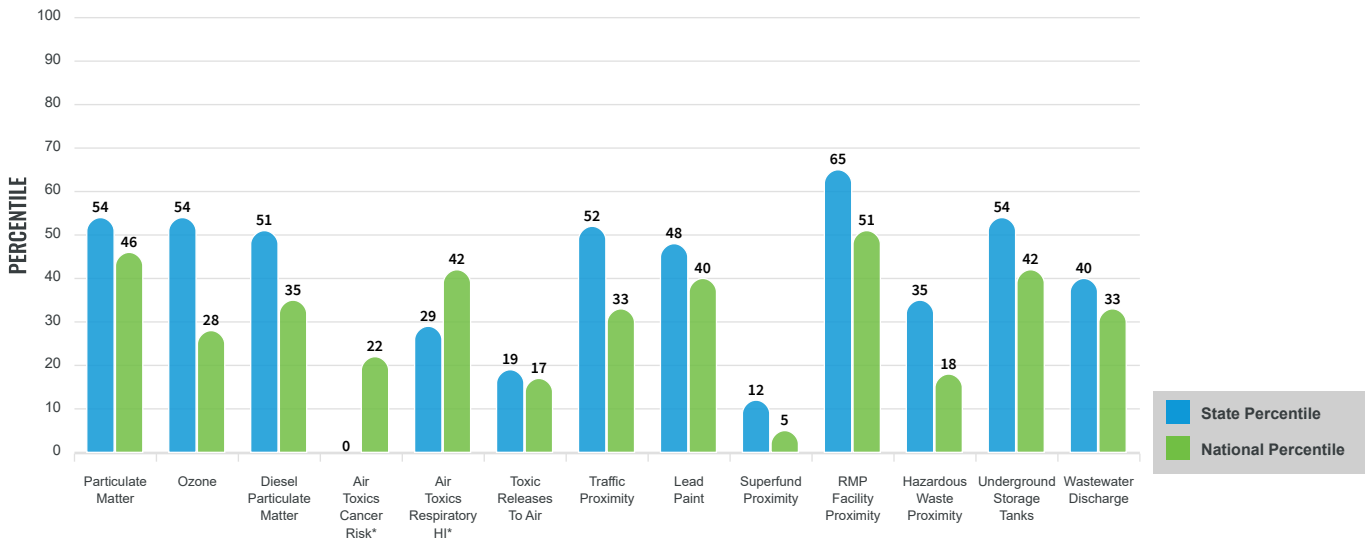
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

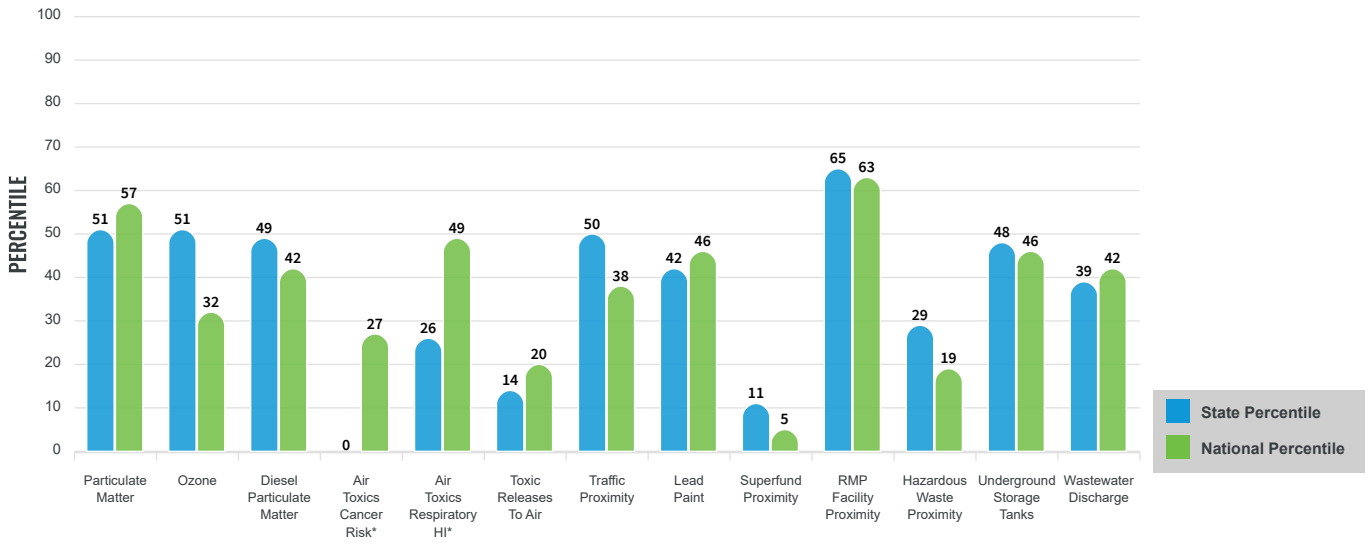
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected block group or buffer area compares to the entire state or nation.

Report for County: Woodford

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter (µg/m^3)	8.51	8.54	53	8.08	58
Ozone (ppb)	58.7	59.3	57	61.6	29
Diesel Particulate Matter (µg/m^3)	0.167	0.203	49	0.261	36
Air Toxics Cancer Risk* (lifetime risk per million)	20	26	0	25	5
Air Toxics Respiratory HI*	0.3	0.32	2	0.31	31
Toxic Releases to Air	62	7,500	19	4,600	19
Traffic Proximity (daily traffic count/distance to road)	41	78	56	210	36
Lead Paint (% Pre-1960 Housing)	0.21	0.24	57	0.3	49
Superfund Proximity (site count/km distance)	0.011	0.039	11	0.13	5
RMP Facility Proximity (facility count/km distance)	0.46	0.33	80	0.43	74
Hazardous Waste Proximity (facility count/km distance)	0.084	0.78	32	1.9	17
Underground Storage Tanks (count/km^2)	0.97	1.1	64	3.9	47
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.028	0.48	81	22	75
SOCIOECONOMIC INDICATORS					
Demographic Index	18%	26%	33	35%	28
Supplemental Demographic Index	11%	16%	29	14%	43
People of Color	14%	16%	62	39%	29
Low Income	22%	37%	28	31%	42
Unemployment Rate	3%	6%	42	6%	39
Limited English Speaking Households	2%	1%	86	5%	65
Less Than High School Education	8%	13%	38	12%	51
Under Age 5	6%	6%	60	6%	61
Over Age 64	19%	17%	61	17%	62
Low Life Expectancy	21%	22%	29	20%	61

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	137
Air Pollution	7
Brownfields	0
Toxic Release Inventory	11

Other community features within defined area:

Schools	7
Hospitals	2
Places of Worship	17

Other environmental data:

Air Non-attainment	No
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for County: Woodford

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	21%	22%	28	20%	61
Heart Disease	6.5	7.4	27	6.1	58
Asthma	10.7	11.5	26	10	73
Cancer	6.7	6.5	47	6.1	59
Persons with Disabilities	13.4%	18.3%	27	13.4%	55

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	8%	12%	52	12%	58
Wildfire Risk	0%	3%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	13%	17%	40	14%	55
Lack of Health Insurance	4%	6%	39	9%	28
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Report for County: Woodford