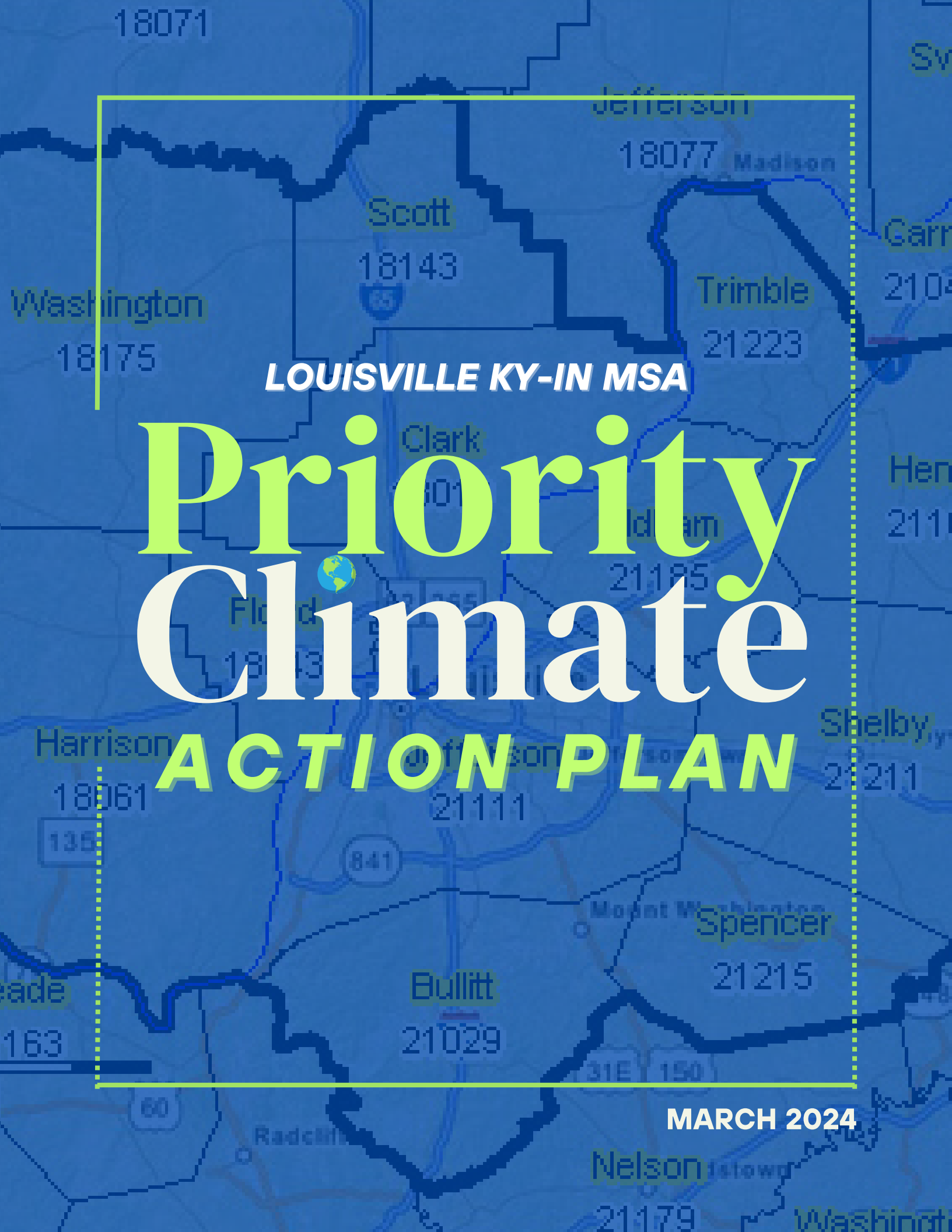

LOUISVILLE KY-IN MSA

Priority Climate ACTION PLAN

MARCH 2024

Prepared for the Louisville Kentucky-Indiana Metropolitan Statistical Area (Louisville KY-IN MSA), including:

1. Louisville/Jefferson County, Kentucky
2. Bullitt County, Kentucky
3. Oldham County, Kentucky
4. Shelby County, Kentucky
5. Spencer County, Kentucky
6. Henry County, Kentucky
7. Trimble County, Kentucky
8. Clark County, Indiana
9. Floyd County, Indiana
10. Harrison County, Indiana
11. Washington County, Indiana

Project Team

Lead Organization and Project Manager

Louisville/Jefferson County Metro Government (LMG)
Mayor's Office of Sustainability

Research and Technical Partners

University of Louisville
University of Strathclyde
LMG Air Pollution Control District
Keramida

Stakeholder Facilitation

David Neumann, PhD
Annette Dangerfield (LMG Mayor's Office)

The Louisville KY-IN MSA's Five PCAP Measures

Residential Energy Upgrades

Advance existing and new residential buildings towards net zero or net zero readiness through robust campaigns, financing, and workforce development.

Commercial/Institutional Energy Upgrades

Accelerate ambitious energy efficiency and clean energy actions at scale through innovative technical assistance, financing, and workforce development.

Industrial Efficiency Program

Boost industrial emissions reductions through customized technical assistance and financing strategies with built in community oversight.

Transportation Modal Shift

Transform the transportation system through critical investments in transit and active mobility.

Waste and Wastewater Upgrades

Invest in meaningful waste and wastewater infrastructure upgrades and programming to reduce emissions and improve quality of life.

MARCH 2024

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Acknowledgements

The Louisville Metro Government (LMG) Mayor's Office of Sustainability (OS) extends its heartfelt gratitude to all individuals and organizations who have played an instrumental role in the successful completion of the Louisville Kentucky-Indiana Metropolitan Statistical Area (Louisville KY-IN MSA)'s Priority Climate Action Plan (PCAP). This collaborative effort has been enriched by the dedication, expertise, and support of a diverse range of stakeholders and partners.

Firstly, we thank the U.S. Environmental Protection Agency (EPA) for providing the Climate Pollution Reduction Grant (CPRG) opportunity that facilitated the realization of our MSA's PCAP. This grant has empowered us to address critical climate challenges while also advancing key community priorities. We are also grateful for our MSA's leadership - Louisville's Mayor Greenberg and the County Judge Executives of our 11-county Louisville KY-IN MSA for their ongoing leadership and support towards creating a more resilient and environmentally conscious future.

We express our sincere appreciation to the University of Louisville (UofL) and the University of Strathclyde (UofS) for their invaluable contributions to the research components of the report. The greenhouse gas (GHG) inventory and quantification of priority GHG reduction measures, led by the UoS, and the low-income and disadvantaged communities (LIDAC) benefits analysis and key LIDAC stakeholder interviews, led by UoL, have provided critical insights that form the foundation of our climate action strategies. We also thank the LMG Air Pollution Control District (APCD) and the Keramida team for providing technical advice and support for the development of the PCAP. Additionally, we would like to recognize Elevate, Greenlink, and Environmental Defense Fund for offering technical assistance.

Special thanks are extended to Dr. David Neumann (Expert Facilitator) and Annette Dangerfield (Project Manager with the Mayor's Office) for their unwavering commitment to stakeholder engagement. Their expertise and guidance have been pivotal in ensuring that the perspectives of a wide range of relevant stakeholders were considered, contributing to the inclusivity and effectiveness of the Priority Climate Action Plan.

We extend our gratitude to the nearly 80-member Net Zero Advisory Group (NZAG) for their dedication and expertise in shaping the recommendations and strategies outlined in the report. Their diverse perspectives and collective wisdom have been essential in crafting a meaningful plan for the Louisville KY-IN MSA's sustainable future.

A heartfelt thank you is extended to the 1000+ residents in the Louisville KY-IN MSA who took the time to participate in the regional climate action plan survey. Your input has provided essential insights into the priorities and concerns of our community, shaping the strategies that will guide our collective efforts towards a more sustainable and resilient future. We would also like to express our appreciation to the numerous other stakeholders who provided valuable input throughout the planning process through meetings and interviews.

This endeavor would not have been possible without the collective commitment of all those involved. We are grateful for the collaboration, dedication, and expertise that each contributor brought to this significant initiative. Together, we are paving the way for a more sustainable and resilient Louisville KY-IN MSA region.

Disclaimer

This PCAP is presented as a preliminary document, reflecting the project team's initial efforts in identifying climate pollution reduction priorities within the Louisville KY-IN MSA community. To meet the ambitious PCAP timeline issued by the EPA, some assumptions were made with available data with regards to the Greenhouse Gas (GHG) Inventory and Quantified Reduction Measures, which are detailed in the respective sections of this report.

Further, it's important to note that not every critical stakeholder was reached during the formulation of this report. While we have made diligent efforts to engage a broad spectrum of important perspectives, time constraints have limited the extent of our outreach.

The PCAP outlines high-level priorities and recommendations based on the best available information within the given timeframe. However, this document is not exhaustive, and there is an understanding that further refinement and enhancement will be necessary. The PCAP serves as a foundational step towards a more comprehensive understanding of our community's climate needs. Looking ahead, we are committed to an iterative and inclusive process. We anticipate releasing a Comprehensive Climate Action Plan (CCAP) in 2025, as required by the EPA, that will build upon the findings and feedback received during the PCAP phase. This forthcoming CCAP will delve deeper into specific strategies, incorporating a broader range of stakeholder perspectives and refining our approaches based on ongoing assessments.

More information on engaging with the CCAP effort will be available in the summer of 2024 at louisvilleky.gov/sustainability. Your insights and feedback are crucial in ensuring that our climate action plans are reflective of the diverse needs and aspirations of our community. Thank you for your continued collaboration as we work towards a more sustainable and resilient future for the region.

This project has been funded wholly or in part by the United States Environmental Protection Agency (EPA) under assistance agreement 5D-02D58023-0 to Louisville Metro Government. The contents of this document do not necessarily reflect the views and policies of the EPA, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.

Definitions and Acronyms

APCD	Air Pollution Control District
CCAP	Comprehensive Climate Action Plan
CEJST	Climate and Environmental Justice Screening Tool
CPRG	Climate Pollution Reduction Grant
EPA	U.S. Environmental Protection Agency
ERI	Environmental Resilience Institute
GHG	Greenhouse Gas
GPC	Global Protocol for Communities-Scale Greenhouse Gas Emissions Inventories
IU	Indiana University
IRA	Inflation Reduction Act
KIPDA	Kentuckiana Regional Planning and Development Agency
LG&E	Louisville Gas & Electric Company
LIDAC	Low Income Disadvantaged Communities
LMG	Louisville Metro Government
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
NEI	EPA's National Emissions Inventory
NZAG	Net Zero Advisory Group
OS	LMG Mayor's Office of Sustainability
PCAP	Priority Climate Action Plan
RTC	Regional Transportation Council
UofL	University of Louisville
UofS	University of Strathclyde

GHG Inventory Terms:

tCO2e	Metric tons of carbon dioxide equivalents
CO2	Carbon Dioxide
CH4	Methane
N2O	Nitrous Oxide
HFC	Hydrofluorocarbon
PFC	Perfluorocarbon
SF6	Sulfur hexafluoride
NF3	Nitrogen trifluoride

1. Introduction

The Louisville Kentucky-Indiana Metropolitan Statistical Area (Louisville KY-IN MSA) is one of 80 most populous Metropolitan Statistical Areas (MSAs) in the United States to be awarded the U.S. Environmental Protection Agency (EPA)'s Climate Pollution Reduction Planning Grant (CPRG) to create a regional climate action plan. The intent of the CPRG is to help communities develop and implement ambitious greenhouse gas (GHG) reduction measures, deliver significant community benefit specifically to low-income and disadvantaged communities, complement other funding sources for an efficient utilization of grant funds, and create scalable and replicable solutions for national impact.

While Indiana received a state-wide CPRG planning grant, Kentucky was one of four states that declined state-level CPRG funding. As the most populous MSA in Kentucky and the third most populous MSA touching Indiana (following Indianapolis and Chicago), the Louisville KY-IN MSA is committed to leading a regional climate planning process that is not only transformative for our MSA, but has lasting, positive ripple effects throughout both Kentucky and Indiana.

Louisville/Jefferson County Metro Government (LMG, a merged city-county government), through its Mayor's Office of Sustainability (OS) served as the primary applicant for the CPRG with support from the City of New Albany, IN, and Indiana University (IU). OS continues to serve as a primary coordinator for the regional climate planning process, which engages and is supported by numerous stakeholders and community members. OS's mission is to collaboratively and equitably build a climate-responsible and climate-resilient Louisville to advance quality of life for all residents within Louisville and beyond. Through the CPRG opportunity, OS is extending that work throughout the Louisville KY-IN MSA in close collaboration with MSA partners, stakeholders, and residents.

1.1 CPRG Overview

This PCAP is the first major deliverable under the CPRG planning grant awarded to the Louisville KY-IN MSA. This document is only a preliminary plan - the Louisville KY-IN MSA project team will continue research, planning, engagement, and action to reduce emissions; invest in sustainable infrastructure, technologies, and practices; build a sustainable economy; and enhance the quality of life in the region. In 2025, the Louisville KY-IN MSA will publish a comprehensive climate action plan (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, the Louisville KY-IN MSA 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.

The CPRG, supported by the Inflation Reduction Act (IRA), is an opportunity for unprecedented support to address climate change causing GHG emissions in the Louisville KY-IN MSA. The CPRG program aims to mitigate the harmful socioeconomic effects of excessive GHG pollution by encouraging proactive strategies in areas of our counties that have historically been left behind. The Louisville KY-IN

MSA's larger climate action goals are paralleled in the PCAP below. We hope to accomplish an expansion in social and technological equity with a vast decrease in GHG emission throughout the MSA.

LMG has set the following goals:

- Metro Council Resolution for 100% clean energy by 2040. This includes: 100% clean electricity for LMG operations by 2030, 100% clean energy for LMG operations by 2035, 100% clean energy community-wide by 2040.
- Metro Council Resolution and Mayoral Executive Order for net zero GHG emissions community-wide by 2040. This includes an interim goal of 50% reduction in GHG emissions community-wide by 2030.

The CPRG's goals are in line with Louisville KY-IN MSA's goals, and the project team continues to identify aligned priorities in other cities and counties in the MSA.

Note the general outcomes that Louisville hopes to see from this PCAP:

1.2 PCAP Overview and Definitions

Per the EPA's guidelines, the PCAP includes the following components:

- A GHG inventory - The GHG inventory was developed using existing regional data and is a simplified version of the inventory to be completed during the CCAP phase. More information about the inventory process can be found in section 2.1.
- GHG reduction targets - GHG reduction targets have been calculated using ClimateView based on the implementation of the priority reduction measures. Additional information regarding the reduction targets can be found in section 2.3.
- Priority GHG reduction measures - The core project team has identified a focused list of near-term, high-priority measures that are ready for implementation. Additional information on each measure is available in section 2.4.
- A Low Income / Disadvantaged Communities (LIDAC) benefits analysis for the PCAP and the measures within it - The LIDAC benefits analysis evaluated the ninety-seven LIDAC communities within the Louisville KY-IN MSA and established measures to address community needs within the PCAP. Additional information about the LIDAC benefits analysis can be found in section 2.3 below.
- A review of authority to implement for each reduction measure - The core project team has identified outstanding actions necessary for obtaining implementing authority. Additional information regarding the authority to implement can be found within the individual reduction measure description.

Scope of the PCAP

The GHG Inventory section of this PCAP further outlines the geographic, temporal, sectors, and emissions scopes included in this plan.

Approach to Developing the PCAP

Below is an outline of the approach and activities undertaken to develop the PCAP. This builds on the approach described in the CPRG application work plan.

Stakeholder and Community Engagement

OS serves as the project manager and lead coordinating agency for the PCAP. OS continues to be committed to a robust and inclusive engagement process that represents priorities of stakeholders and community members across the Louisville KY-IN MSA. Due to time constraints, OS's outreach was limited, but OS plans to continue deeper engagement throughout the CCAP phase.

Photographs from an NZAG meeting

Below is a description of the stakeholder and community engagement approach that was utilized to develop the PCAP:

Core Team: OS assembled a core team to lead the key aspects of developing the PCAP. The team included:

- LMG's Mayor's Office of Sustainability (OS) - Overall project management and programmatic support
- University of Strathclyde (UofS) - Research lead for the GHG inventory and quantified reduction measures
- University of Louisville (UofL) - Research lead for the Low-Income and Disadvantaged Communities (LIDAC) analysis
- David Neumann (contracted facilitator) and Annette Dangerfield (Project Manager with the LMG Mayor's Office) - Stakeholder engagement and expert facilitation
- LMG's Air Pollution Control District (APCD) - review of previous climate plans and studies, technical partner
- Keramida - Technical partner

Net Zero Advisory Group (NZAG): The core team invited a group of over 100 stakeholders representing various areas, sectors, and communities to serve on the NZAG and advise on the development of priority actions for the PCAP. The NZAG met 4 times (9 hours in total) through a combination of virtual and in-person meetings to advise on implementation ready strategies in key emissions sectors including residential buildings, commercial buildings, industry, and transportation. Nearly 80 members regularly participated in these meetings.

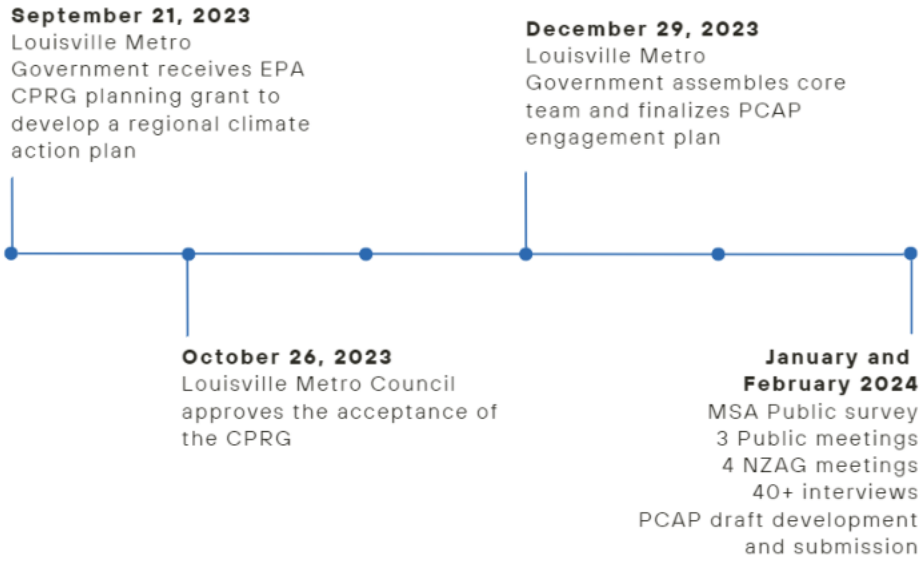
Key stakeholder interviews: UofL conducted 44 one-on-one key stakeholder interviews with individuals representing LIDAC communities and interests to better understand LIDAC priorities. Some interviewees were compensated for their time and expertise through the CPRG grant. The process for identifying these stakeholders is further described in the LIDAC Benefits Analysis section. Additionally, OS and UofS conducted several more one-on-one meetings with potential delivery partners and businesses to better understand priorities and implementation-ready projects.

Priority project questionnaire: OS distributed a project questionnaire to numerous governmental agencies, institutional partners, and businesses to identify a pipeline of implementation ready projects that could meet PCAP criteria, and received over 50 responses.

Public Survey: The core team developed and disseminated a regional climate action survey that was open to all residents in the Louisville KY-IN MSA and received 1,048 unique responses. While the survey garnered a greater proportion of responses from Louisville, we received some responses from each county included in the MSA. UofL analyzed the survey responses.

Public Meetings: OS hosted 3 public meetings to discuss PCAP priorities and engaged approximately 50 residents. Two of the meetings were virtual, one was in-person (located in an LIDAC community), and the virtual meeting recordings were made available on the MSA's official regional climate action plan **webpage** (hosted on the OS's website).

Stakeholders for the NZAG, key stakeholder interviews, and priority project questionnaires were identified by developing a thorough list of all known contacts representing various relevant counties, sectors, and interests for the PCAP. The initial list of over 250+ stakeholders was condensed to approximately 100 by prioritizing major emissions sectors (residential buildings, commercial buildings, industry, and transportation). Further, at every engagement session, the project team consistently requested the NZAG, members of the public, and others to recommend other important contacts who should be included in the conversation. A live database of contacts was maintained and continuously updated by OS to include in future engagement opportunities.



PCAP development timeline

Review of Previous Climate Plans

APCD created a detailed database of PCAP-relevant actions identified in Louisville's previous climate plans to review and reference during the early stages of the planning process. The database was shared with the NZAG as pre-work so that discussions could be built on previous efforts, successes, and lessons learned. In particular, the following plans were reviewed:

- The Partnership for a Green City's 2009 Climate Action Report
- Louisville's 2020 Greenhouse Gas Emissions Reduction Plan
- The regional climate plan webpage also includes links to several other relevant past studies and reports completed in Louisville such as the 2020 Climate Change Vulnerability Report and the 2016 Urban Heat Management Study.

Further, other regional plans, studies, and resources continue to be referenced. For example, the Indiana University (IU) Environmental Resilience Institute (ERI) has established The Hoosier Life Survey (HLS) which is Indiana's most comprehensive statewide public-opinion survey on environmental change. Additionally, their body of work contains tools to help measure the value and cost-effectiveness of

carbon-cutting actions, works with local governments for community specific resources and data, and provides information on funding opportunities.

The Kentuckiana Regional Planning & Development Agency (KIPDA) is a designated Economic Development District (EDD) in the Louisville KY-IN MSA, and as a Area Development District (ADD), KIPDA developed a Comprehensive Economic Development Strategy (CEDS) that identifies regional priorities and economic and community development strategies. Additionally, it manages the Metropolitan Planning Organization (MPO) funds for programs in Indiana and Kentucky, such as:

- Carbon Reduction Programs
- Congestion Mitigation and Air Quality (CMAQ-MPO)
- Highway Safety Improvement Program (HSIP-MPO)
- Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT)
- Surface Transportation Block Grant (STBG-MPO)
- Transportation Alternatives (TA-MPO)

These documents were referenced in the development of the PCAP. When published, the HSA was one of the most comprehensive opinion surveys on climate change in the nation, representing over 2,500 Indiana residents in ninety of the State's ninety-two counties. The survey, across many categories, touches on the socioeconomics of climate change, which respondents from lower income households felt was going to "personally harm" them at a higher rate than those who were wealthier. Residents across location types (rural, small town, suburban, urban) also said they had an interest in exploring solar installation for their homes. The methodology used by IU to obtain these results - interviewing diverse populations across geographic locations - is indicative of how the Louisville KY-IN MSA's project team has managed engagement with its own LIDAC communities and 11-county residents, keeping in spirit with HSA's findings in its study, and the vulnerable populations that are adversely affected by climate change.

KIPDA's Comprehensive Economic Development Strategy (CEDs) provides a five-tiered approach that is focused on 1) economic growth, 2) workforce development, 3) transportation, 4) water and waste-water, and finally 5) quality of life in the region - all points of emphasis in the enclosed PCAP, again with the Louisville KY-IN MSA's LIDAC communities and residents outside current infrastructure. The project team has a relationship with KIPDA, a member of the NZAG, and is eager to use this grant opportunity to supplement and build upon the organization's goals.

GHG Inventory, Quantification of Reduction Measures, and Benefits Analysis
The respective sections below describe the approach to developing these sections of the PCAP.

Review of Authority to Implement
During the stakeholder engagement process, PCAP ideas generated were continuously vetted by the project team and the stakeholders to ensure authority to implement by relevant implementing agencies. Further, during the implementation phase, customized Memoranda of Agreements will be drawn with each funding recipient and delivery partner, outlining scopes and responsibilities within statutory permissibility.

1.3 MSA Context

The Louisville KY-IN MSA counties share a history of fossil fuel dependency that has subsequently inflicted environmental injustices on its residents, exacerbated by structural socio-economic inequities. For example, parts of the counties that experienced discriminatory practices such as redlining face higher exposures to air pollution and other health impacts, as well as increased vulnerability to climate impacts such as rising urban heat and wind storms. The 11-county MSA region comprises over 1.2 million residents, of which 26% are identified as LIDAC by the Climate and Environmental Justice Screening Tool (CEJST). The Louisville KY-IN MSA populations represent 11% of the combined populations of Kentucky and Indiana. This context is important to consider as we work to design a cleaner, healthier, and more efficient economy for the future.

MSA County Profiles

1. Louisville/Jefferson County, Kentucky
Louisville/Jefferson County is a merged city-county area and is Kentucky's and the MSA's largest city, with a population of 633,045 (2020) and a median household income of $63,114. Louisville sits along the Ohio River, bordering southern Indiana, and has an economy characterized by manufacturing, health and aging innovation, logistics, food and beverage, and more. It is home to two Ford assembly plants, two fossil-fueled power plants, a chemical production industrial complex, an international airport that is home to UPS' largest air facility, Worldport, and lies at the convergence of three US interstates.

2. Bullitt County, Kentucky
Bullitt County, KY is the 10th most populated county in the state with a population of 82,217 (2020) and a median household income of $76,810.[1] Roughly 40,000 acres serve as part of the US Army Post Fort Knox, one of the largest military institutions in the US.[2] Bullitt County sits along I-65, a major transportation corridor throughout the South and the Midwest, transforming it into a large distribution hub housing employers such as Amazon, UPS, Supply Chain Solutions, and more.

3. Oldham County, Kentucky
Oldham County, KY sits 20 miles northeast of Louisville Metro with a population of 67,607 (2020).[3] In 2017, 51,467 acres of farmland were located within the county.[4] Additionally, there are 23,064 housing units throughout its established and developing neighborhoods with a median household income of $115,187. Oldham County School District serves over 12,000 students and ranks as one of the highest performing school districts in the state.[5]

4. Shelby County, Kentucky
Shelby County, KY known as the Saddlebred Capital of the world, has a population of 48,065 (2020) and is situated directly between Louisville and Lexington, two of the most populous cities in the state of

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[1] U.S. Census Bureau; Bullitt County Kentucky – Profile, 2020. https://data.census.gov/profile/Bullitt_County,_Kentucky?g=050XX00US21029 (accessed February 2024)
2 City of Shepherdsville, "Bullitt County - Overview," Accessed February 2024. https://shepherdsvilleky.gov/community/bullitt-county/

3 U.S. Census Bureau; Oldham County Kentucky – Profile, 2020. https://data.census.gov/profile/Oldham_County,_Kentucky?g=050XX00US21185 (accessed February 2024)

4 United States Department of Agriculture, "2017 Census of Agriculture County Profile - Oldham County Kentucky," Accessed February 2024.

https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Kentucky/cp21185.pdf

5 Oldham County Schools, "About Oldham County Schools," Accessed February 2024. https://www.oldham.kyschools.us/district/about-our-district

Kentucky.[6] The average household income is $81,012 and the largest industries are manufacturing, health care and social assistance, and retail trade.[7] Shelby County offers a variety of tourist activities such as distillery and winery tours, outdoor recreation, and shopping.

5. Spencer County, Kentucky

Spencer County, KY has a population of 19,490 (2020) with an average household income of $101,118 spread throughout 7,430 housing units.[8] Spencer County is home to a large portion of Taylorsville Lake, which expands across 3,050 acres and is a popular destination for outdoor enthusiasts.[99]

6. Henry County, Kentucky

Henry County has a population of 15,678 (2020)[10] spread across 6,000 households. The median household income is $58,294. Roughly a third of the current workforce is employed inside the county, while the mean travel to work time for individuals is just under 30 minutes daily.

7. Trimble County, Kentucky

Trimble County, population 8,474 (2020), is directly north of Henry County. There are 3,273 households with a median income of $66,492 for a mobile workforce that also averages roughly 30 minutes in commute time to work. The largest industries are manufacturing, transportation, and retail.[11] It is home to investor-owned utility LG&E and KU's largest power plant, which serves over 1,000,000 Kentucky residents.[12]

8. Clark County, Indiana

Across the river, Clark County recorded 121,093 residents (2020) at the last Census in nearly 49,000 households (median household income is $69,005). It is experiencing recent development in its County Seat and largest city, Jeffersonville, and the economy and workforce are engaged primarily in office and administrative support occupations.[13] It is the second largest county in the Louisville KY-IN MSA.

9. Floyd County, Indiana

Floyd County is made up of 80,000 residents (2020) who have an average median income of $75,686 per household spread over 30,000 households. Manufacturing and healthcare are leading industries[14] of occupation and the County Seat of New Albany contains 38,000 people.[15]

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6 U.S. Census Bureau;. Shelby County Kentucky - Profile, 2020. https://data.census.gov/profile/Shelby_County,*Kentucky?g=050XX00US21211* (accessed February 2024)

7 Data U.S.A, "Shelby County, Kentucky," Accessed February 2024. https://datausa.io/profile/geo/shelby-county-ky

8 U.S. Census Bureau; Spencer County Kentucky – Profile, 2020.https://data.census.gov/profile/Spencer_County,_Kentucky?g=050XX00US21215 (accessed February 2024)

9 Visit Taylorsville, "Spencer County Recreation and Tourism," Accessed February 2024. https://visittaylorsville.com/

10 U.S. Census Bureau; Quick Facts - Henry County Kentucky, 2020. https://www.census.gov/quickfacts/fact/table/henrycountykentucky/POP010220#POP010220 (accessed February 2024)

11 Data U.S.A, "Trimble County, Kentucky," Accessed February 2024. https://datausa.io/profile/geo/trimble-county-ky

12 James Bruggers, " LGE coal ash landfill hits another wall," Courier Journal, August 29, 2014.
https://www.courier-journal.com/story/news/local/2014/08/29/epa-suggests-sending-coal-ash-underground-mine/14807005/

13 Data U.S.A, "Clark County, Indiana," Accessed February 2024. https://datausa.io/profile/geo/clark-county-in

14 Data U.S.A, "Floyd County, Indiana," Accessed February 2024. https://datausa.io/profile/geo/floyd-county-in

15 U.S. Census Bureau; Quick Facts - New Albany, Indiana, 2023. https://www.census.gov/quickfacts/fact/table/newalbanycityindiana/PST045221 (accessed February 2024)

10. Harrison County, Indiana

Harrison County is home to over 39,000 residents (2020) and the median household income is $71,302. Its County Seat is Corydon, the first state capital of Indiana, and a twenty-five mile drive from downtown Louisville.[16]

11. Washington County, Indiana

Washington County has 28,182 residents (2020) and a median household income of $60,695. It is the 7th largest county in Indiana at 514 square miles.[17] Manufacturing, healthcare, and retail trade are its largest industries.[18]

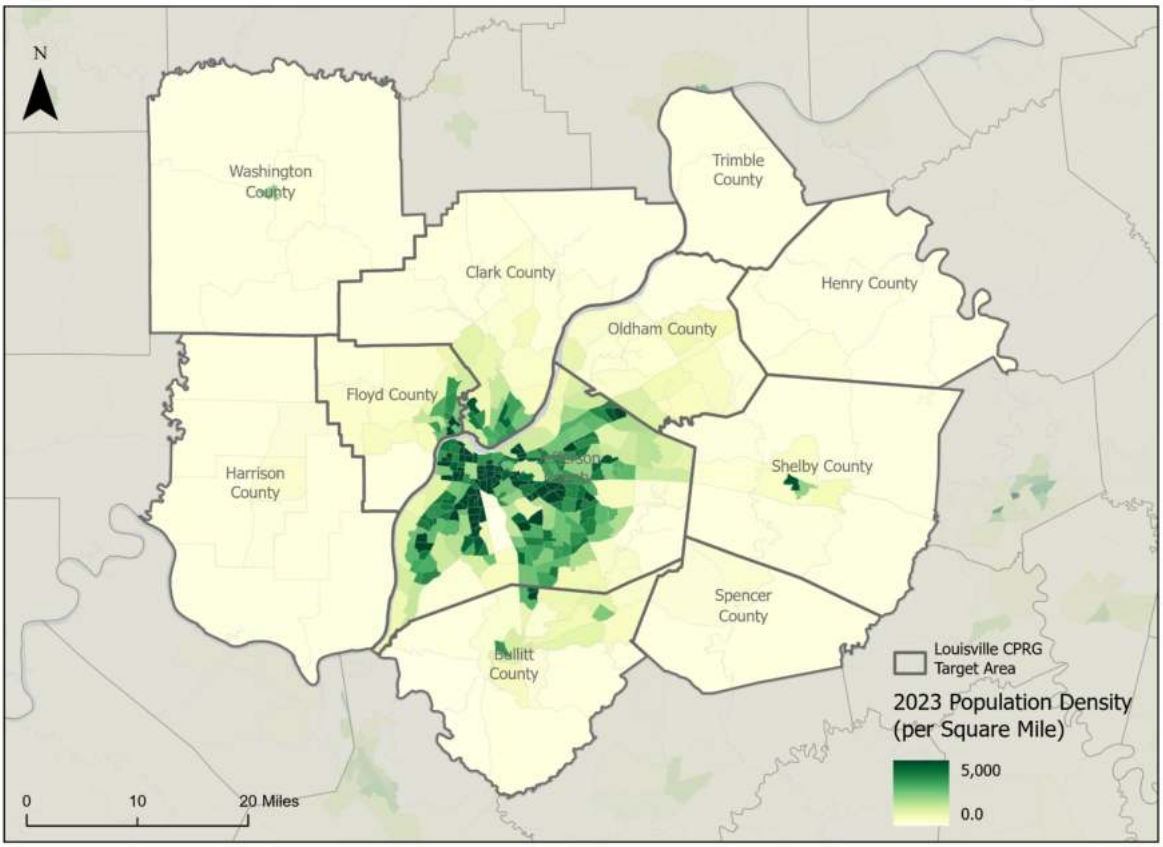

Figure 1: Louisville KY-IN MSA Population Density (per Square Mile), 2023

16 Indiana Government, "Welcome to Harrison County," Accessed February 2024. https://www.in.gov/counties/harrison/

17 Washington County, Indiana, "Explore Washington County," Accessed February 2024. https://www.washingtoncounty.in.gov/index.php

18 Data U.S.A. "Washington County, Indiana," Accessed February 2024. https://datausa.io/profile/geo/washington-county-in

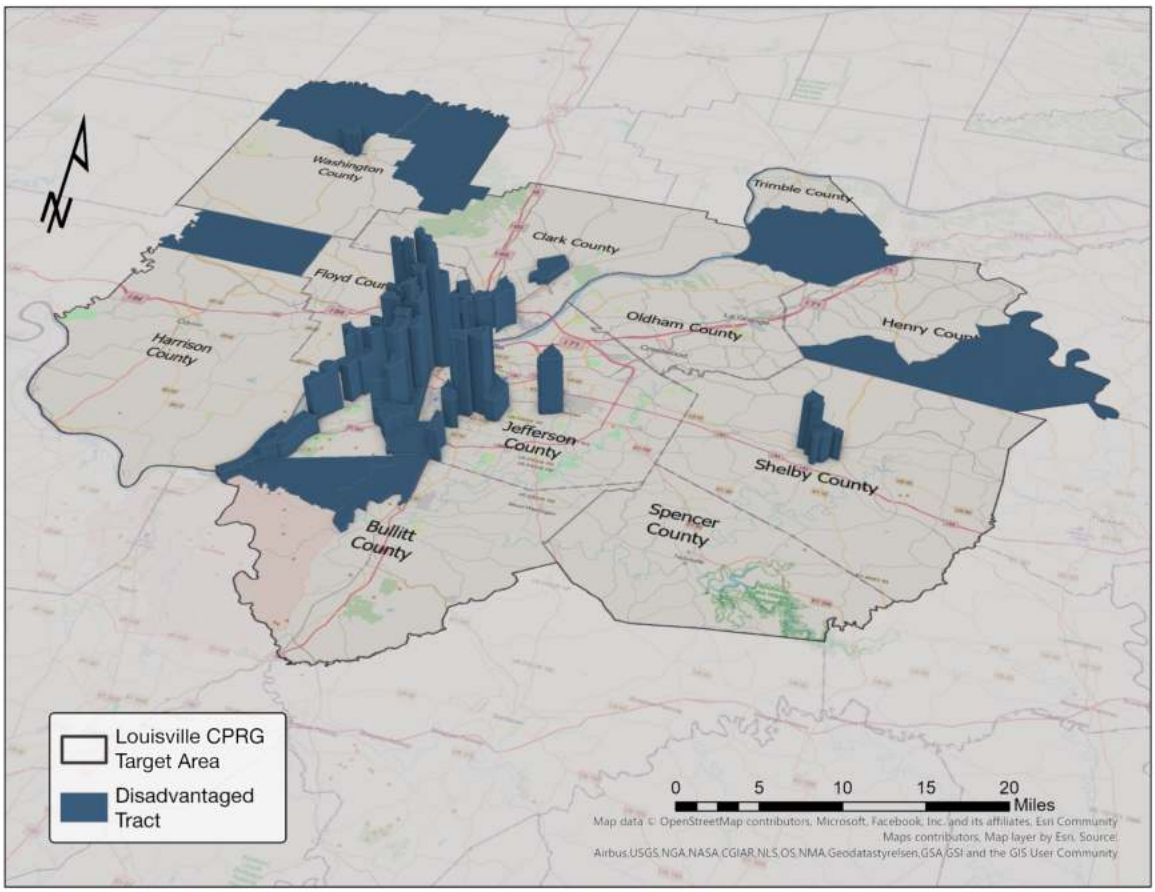

Figure 2: Population Density of Disadvantaged Tracts, 2022. This map depicts population density of disadvantaged tracts along the vertical axis. Source: White House Council on Environmental Quality, Climate and Economic Justice Screen Tool, 2022[19]

19 Justice40 Tracts, "White House Council on Environmental Quality, Climate and Economic Justice Screening Tool Data," ArcGis Online, 2022. https://www.arcgis.com/home/item.html?id=f95344889cab44bd84207052f44cb940

2. PCAP Elements

2.1 Greenhouse Gas (GHG) Inventory

Geographical Scope

This PCAP includes the following counties, based on MSA guidance provided by the EPA for this funding opportunity. In addition, Trimble County, KY has been added, as a result of its inclusion in the KIPDA's MPO and Regional Transportation Council (RTC) service areas:

1. Louisville/Jefferson County, Kentucky
2. Bullitt County, Kentucky
3. Oldham County, Kentucky
4. Shelby County, Kentucky
5. Spencer County, Kentucky
6. Henry County, Kentucky
7. Trimble County, Kentucky
8. Clark County, Indiana
9. Floyd County, Indiana
10. Harrison County, Indiana
11. Washington County, Indiana

Inventory Boundary	MSA information
MSA Name	Louisville KY-IN MSA
Inventory Year	2016
Geographic Boundary	See Figure 16
Land Area (hectares)	838,400 ha
Reporting Year Resident Population	1,253,093 (2016)
GDP (US$)	$70,802,475.00 million (2017)
Composition of Economy	Healthcare & Social Assistance; Manufacturing; and Retail trade
Climate	Humid subtropical climate with four distinct seasons and located in the USDA hardiness zones 6b and 7a

Table 1: Louisville KY-IN MSA Information

Temporal Scope

This inventory covers GHG emissions for the 2016 reporting year. Where 2016 data was not available, the closest year to 2016 was used. 2016 has been selected as the base year for the GHG inventory as a comprehensive GHG inventory exercise (Louisville 2016 Community Greenhouse Gas Emissions Inventory Report) was conducted for 2016 for the LMG area – and this data and analysis provides a robust basis for a GHG inventory for the wider MSA.

Analysis suggests there have been relatively small changes in overall GHG emissions for Louisville KY-IN MSA since 2016. Census data and other sources show population has changed by around 1% since

2016; the built environment is largely stable; there has been relatively small change in patterns of economic activity; and grid emission factors are little changed.

In addition, selection of 2016 as baseline avoids temporary COVID-19 related distortions that would occur were a more recent year chosen as baseline (as COVID-19 depressed economic and transportation activity in 2019/2020 – with recovery from this shock still ongoing in 2022).

Emissions and Sectoral Scope
Emissions and sectoral definitions used follow the standard definitions set out in the Global Protocol for Communities-Scale Greenhouse Gas Emissions Inventories (GPC) (see below).

Data Review
LMG conducted a comprehensive GHG inventory in 2016 for the Louisville/Jefferson County area. The 2016 GHG inventory used multiple data sources including:

- National Emissions Inventory (2017)
- American Community Survey (2015)
- EPA Residential Energy Consumption Survey (2009)
- Census of Agriculture (2012)
- Emissions factors reported by local utility, Louisville Gas and Electric

Data for all 11 Louisville KY-IN MSA counties is required to construct a GHG inventory for the whole area. Relevant data sets deployed in assessing emissions for the wider MSA include:

- NREL SLOPE - County level Gas and Electricity Consumption data (2017)
- NEI Facility level GHG emissions data (2017)
- NEI transport GHG emissions data (2017)
- EPA FLIGHT Major emitters data (2017)
- American Community Survey data

Not all of these data sources are available at county level for 2016. In these cases data available for the closest year to 2016 has been used. Given small changes since 2016 in the underlying factors that drive emissions this would appear unlikely to introduce undue distortion.

GHG Accounting Method
The 2016 GHG inventory for Louisville/Jefferson County inventory was completed in accordance with the GPC Protocol. Under the GPC Protocol, GHG emissions are split between Core (GPC BASIC), and Expanded (GPC BASIC+). Core GHG emissions are those which Louisville KY-IN MSA has the greatest opportunity to influence. Core GHG emissions sources include building energy use, fugitive energy industries, transportation (on-road, marine, and aviation), and waste (includes solid waste, composting and wastewater treatment).

The GPC Protocol sets several assessment boundaries which identify the restrictions for gasses, emission sources, geographic area, and time span covered by a GHG inventory:

- The GHG inventory is required to include all seven Kyoto Protocol GHGs occurring within the geographic boundary of a city.

- The GHG emissions from community activities must be classified into the following five categories, based on the selected reporting level:
    - Stationary energy
    - Transportation
    - Waste
    - Industrial processes and product use (IPPU)
    - Agriculture, forestry, and other land use (AFOLU)

The GPC Protocol also requires that a city define an inventory boundary, identifying the geographic area, time span, gasses, and emission sources.

Activities taking place within a city can generate GHG emissions that occur inside the city boundary as well as outside the city boundary. To distinguish between these, the GPC groups emissions into three categories based on where they occur: Scope 1, Scope 2, or Scope 3 emissions. The GPC distinguishes between emissions that physically occur within the city (Scope 1), from those that occur outside the city but are driven by activities taking place within the city's boundaries (Scope 3), from those that occur from the use of electricity, steam, and/or heating/cooling supplied by grids which may or may not cross city boundaries (Scope 2). Scope 1 emissions may also be termed "territorial" emissions, because they are produced solely within the territory defined by the geographic boundary.[20]

In the time available it has not been possible to duplicate for the whole Louisville KY-IN MSA the comprehensive GHG inventory approach taken for Louisville/Jefferson County in 2016. A Scope 1 GHG inventory for the whole Louisville KY-IN MSA has been extrapolated from the 2016 Louisville Metro inventory by using the above data sources to compare sectoral energy consumption and GHG emissions for the Louisville KY-IN MSA with those for Louisville/Jefferson County. Evidence based sectoral ratios were constructed that were used to adjust values in the 2016 GHG inventory to estimate emissions for the whole Louisville KY-IN MSA. Analysis suggests Louisville/Jefferson County contributes around 60% of overall Louisville KY-IN MSA emissions. A Scope 3 GHG inventory has not been prepared at this stage due to data limitations at county level. A comprehensive updated GHG inventory (including Scope 3 GHG Inventory) will be prepared for Louisville KY-IN MSA as an integral part of the CCAP to be developed by Summer 2025.

GHG Emissions by Sector

The sectoral analysis shows that almost half of Louisville KY-IN MSA's emissions are related to heating and cooling of residential and commercial buildings. This reflects in high grid emissions factors for electricity (due to a dominance of coal-fired electricity generation in much of the Louisville KY-IN MSA) and a climate with high seasonal variation – leading to high demand for air conditioning in the Summer and heating demand in the Winter.

Transportation and Industrial emissions make up a further 40% of the Louisville KY-IN MSA's emissions. These four sectors will therefore provide the focus for Louisville KY-IN MSA's PCAP.

20 Wee Kean Fong, et. al., "Global Protocol for Community-Scale Greenhouse Gas Emission Inventories: An Accounting and Reporting Standard for Cities," Greenhouse Gas Protocol, World Resources Institute, December 2014. https://ghgprotocol.org/sites/default/files/ghgp/standards/GHGP_GPC_0.pdf

Louisville Metro MSA SCOPE 1 GHG Inventory 2016		
Sector	**GHG Emissions (tCO2e)**	**% of Total**
Stationary Energy		
Residential Buildings	6,410,939	18.92%
Commercial / Institutional Buildings	5,120,476	15.11%
Manufacturing Industries, And Construction	4,939,829	14.58%
Energy Industries	1,269,682	3.75%
Coal and Natural Gas Fugitive Emissions	75,404	0.22%
Non-Specified Sources	68,227	0.20%
Transportation		
On-Road Transportation	5,092,161	15.03%
Transboundary Transportation	2,036,722	6.01%
Off-Road Transportation	697,957	2.06%
Waste	1,040,624	3.07%
IPPU	7,023,995	20.73%
AFOLU	104,200	0.31%
Total	**33,880,216**	

Table 2: The large facility emissions map shows the pattern of major GHG emitters across the MSA (source Louisville Air Pollution Control District - Louisville Area Emissions Dashboard) – illustrating the strong focus of industry, manufacturing, and waste handling activity in the proximity of Louisville.

GHG Analysis by Sector

The following figures characterize the GHG inventory and include sectoral GHG emissions percentages, metric tons of carbon dioxide equivalents by sector, energy use by sector, the different greenhouse gasses emitted per sector, and fuel consumption by sector.

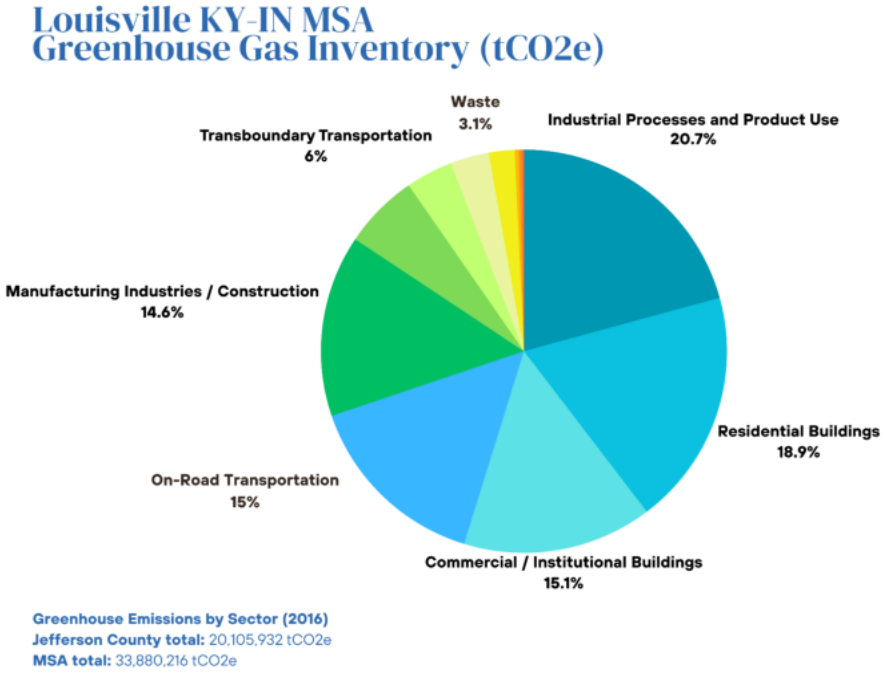

Figure 3: The Louisville KY-IN MSA's largest GHG emitting sectors by percentage of emissions tCO2e. Notably, the top four sectors are: industrial, residential, commercial, and on-road transportation.

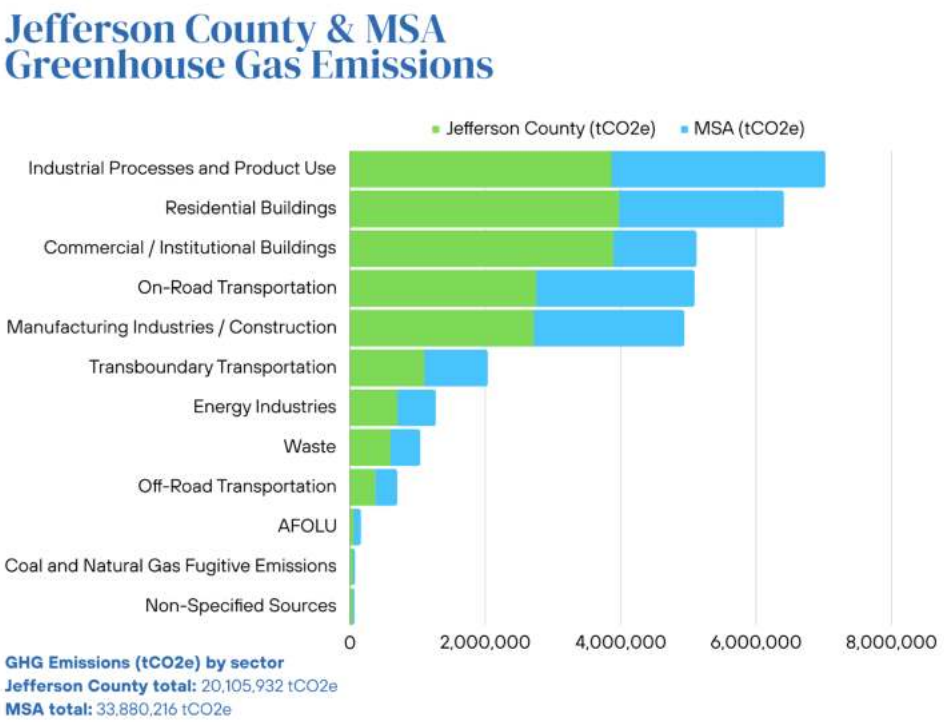

Figure 4: Total quantity of GHG emissions (tCO2e) in Jefferson County, Kentucky compared to the entire MSA.

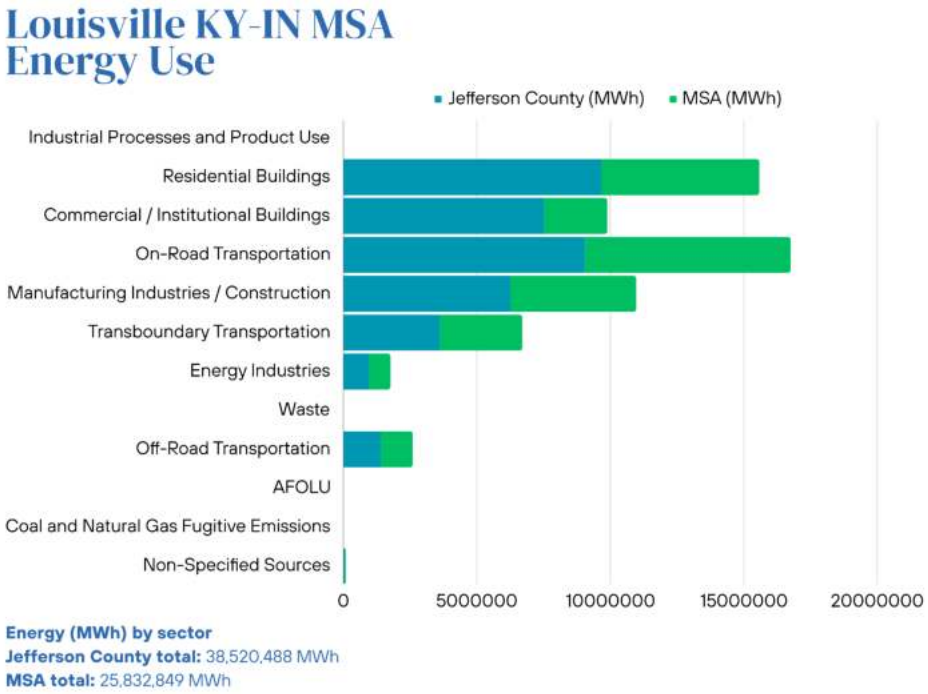

Figure 5: Energy use (MWh) by sector in the MSA, depicted in comparison with Jefferson County, Kentucky. On-road transportation and residential buildings are among the highest energy consumers in the MSA.

The following figures show the quantity of GHG emissions in the MSA by type of GHG (tCO2e) - in total and by sector. While CO2 is the predominant GHG by quantity, CH4 which is a distant second, is 28 times as potent as CO2. In this section, emissions from CO2, CH4, N2O, and HFC have been analyzed. No emissions from PFCs, SF6, or NF3 were estimated in the 2016 baseline due to a lack of availability of data. These GHGs will be studied in the CCAP.

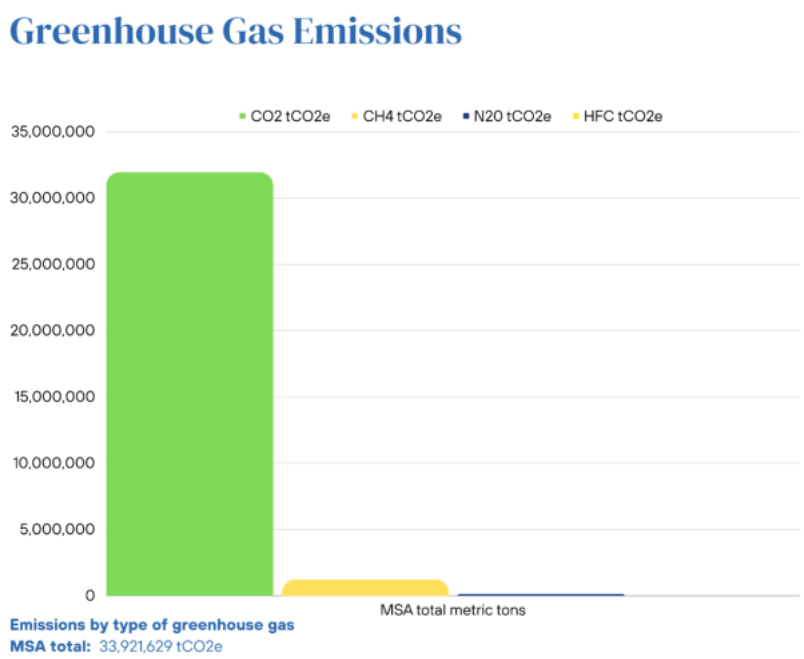

Figure 6: Total quantity of GHG emissions in the MSA by type of GHG (tCO2e). Overall, CO2 forms the vast majority followed by CH4.

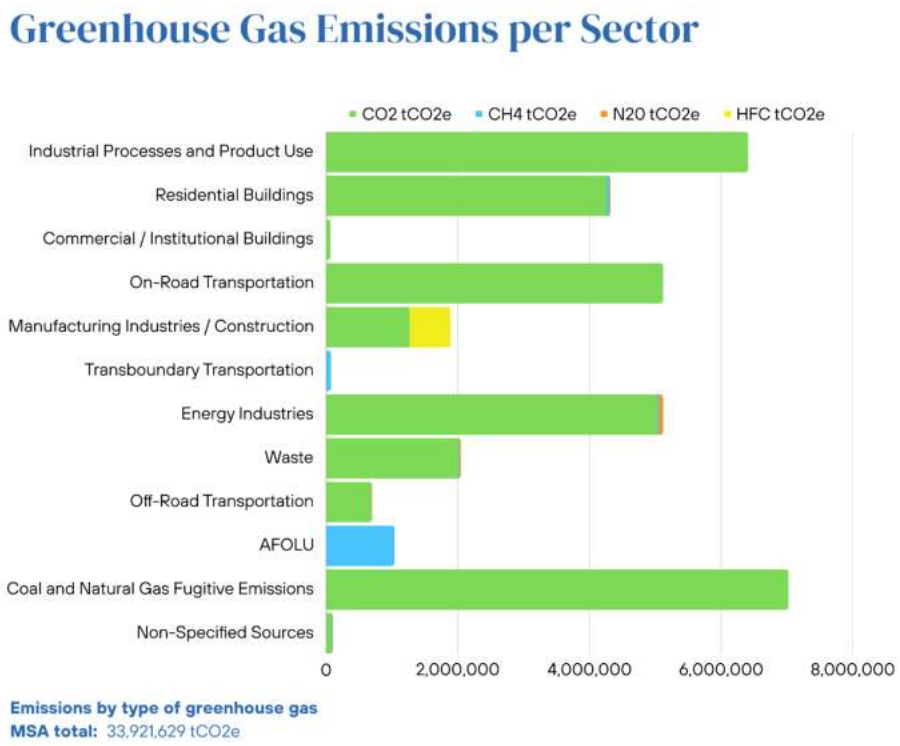

Figure 7: Quantities of GHGs emitted across each sector. Globally and in the MSA, the most common GHG emitted is CO2.

The following figures depict the percentage of energy consumed from various fuel sources across major sectors. Electricity, natural gas, and gasoline form major fuel sources for energy consumption.

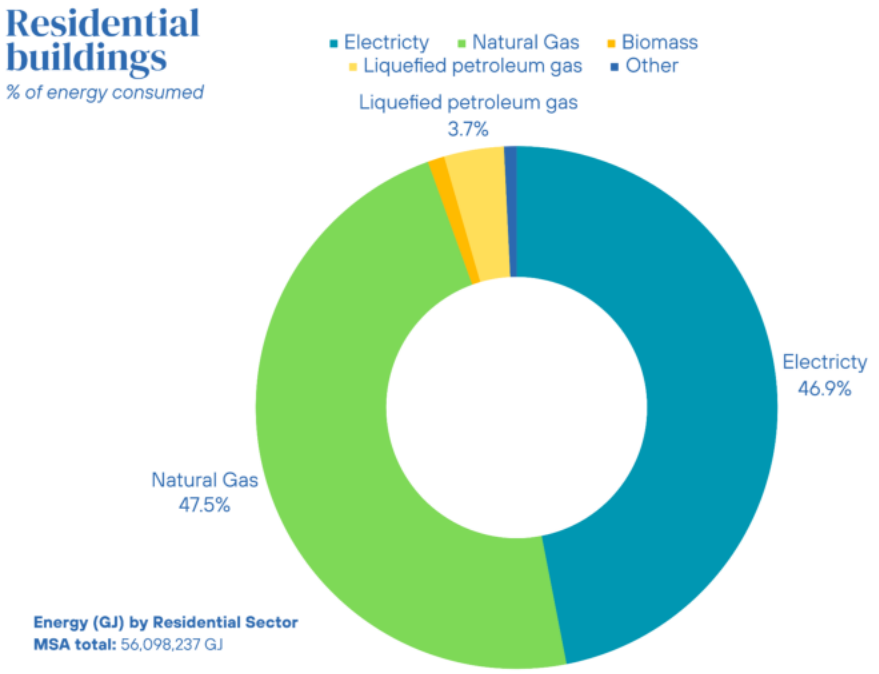

Figure 8: Percentage of energy consumed from various fuel sources in the residential sector across the MSA. Natural gas and electricity comprise nearly half of all fuel sources each, with lesser use of liquified petroleum gas, biomass, and other fuels.

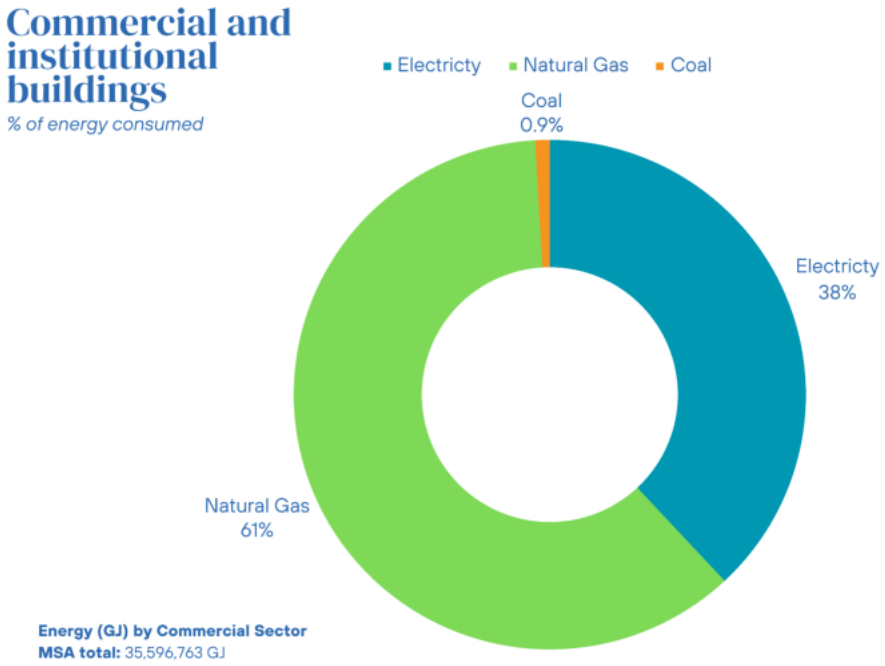

Figure 9: Percentage of energy consumed from various fuel sources in the commercial sector across the MSA. Natural gas forms a higher source compared to the residential sector at 61%.

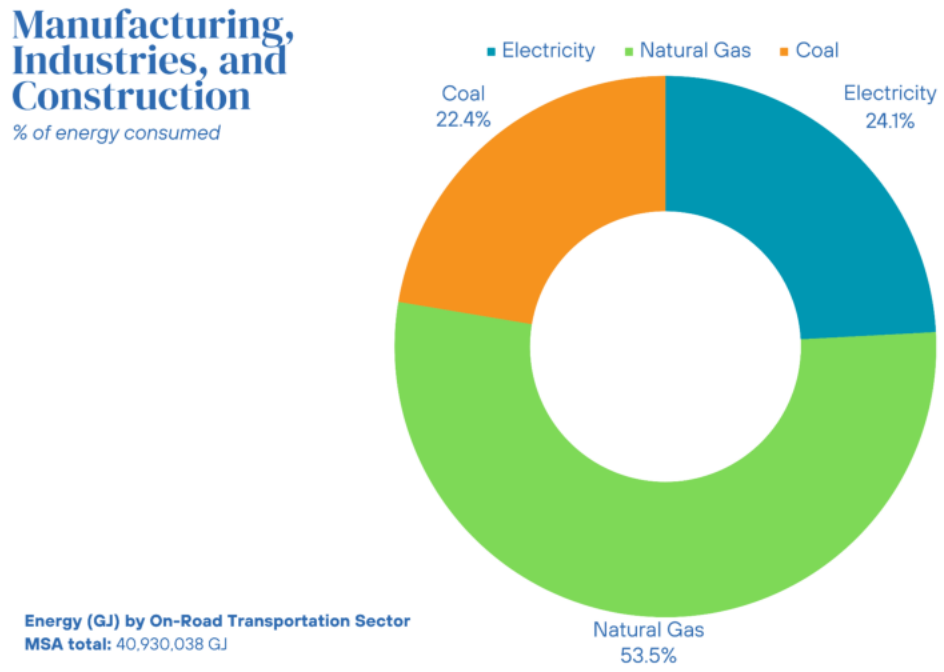

Figure 10: Percentage of energy consumed from various fuel sources in the industrial sector across the MSA. Notably, direct coal combustion forms a significant portion at 22.4%.

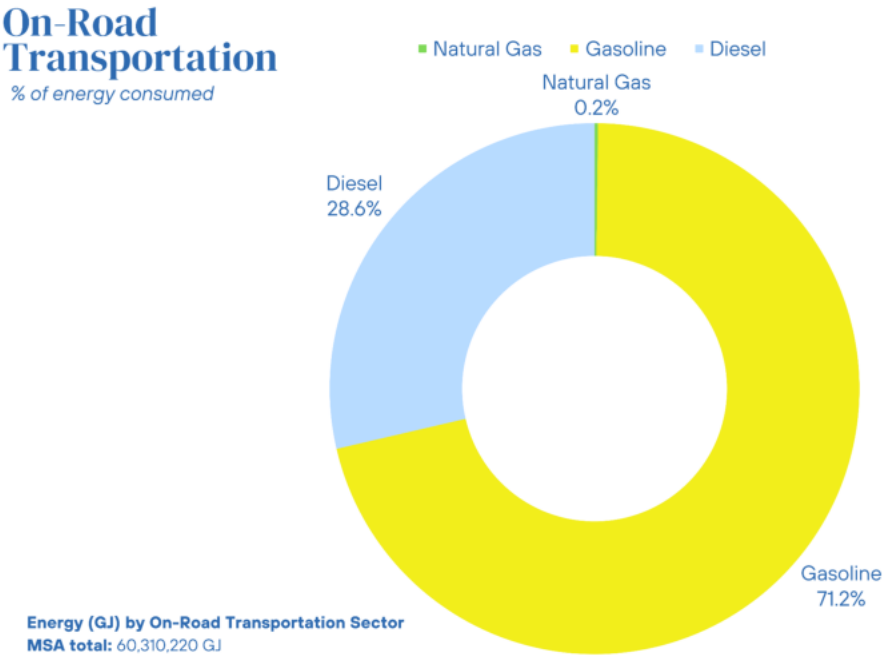

Figure 11: Percentage of energy consumed from various fuel sources in the on-road transportation sector across the MSA. Gasoline forms the largest portion followed by diesel.

The following figures show the percentage of GHGs emitted (tCO2e) from various fuel sources across major sectors in the MSA. For the stationary energy sectors, electricity is consistently the highest source indicating the fossil-fuel based GHG intensity of our utility grids.

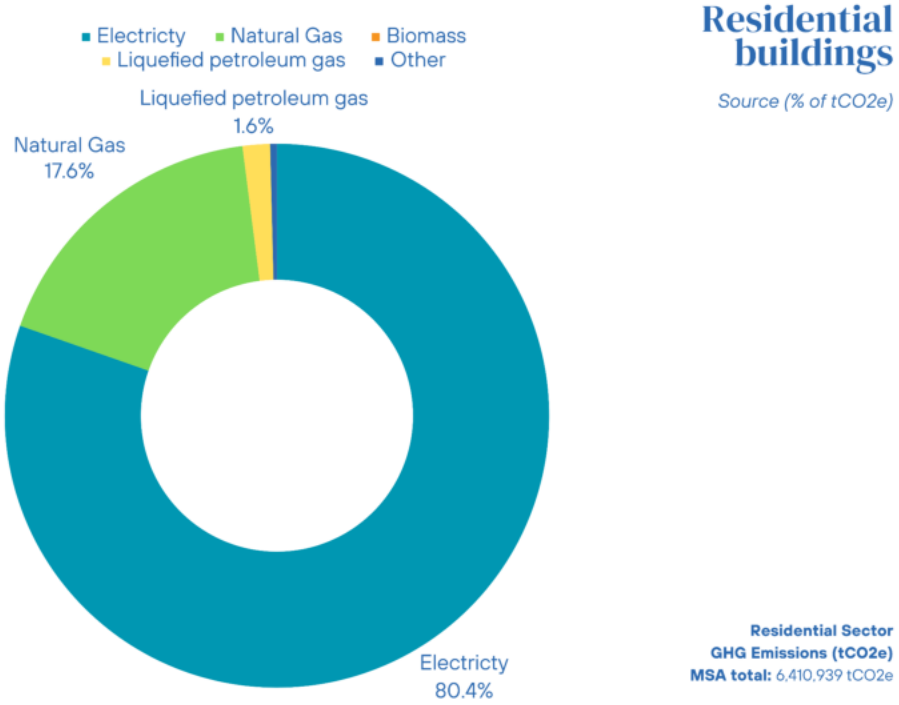

Figure 12: Percentage of GHGs emitted (tCO2e) from various fuel sources in the residential sector across the MSA. Electricity is the largest source at 80.4%.

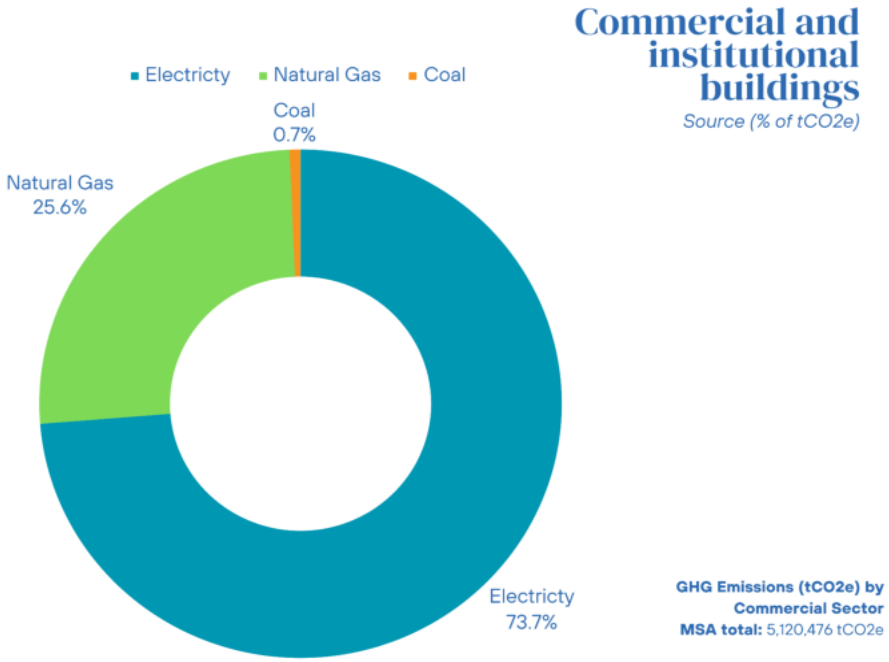

Figure 13: Percentage of GHGs emitted (tCO2e) from various fuel sources in the commercial/ institutional sector across the MSA.

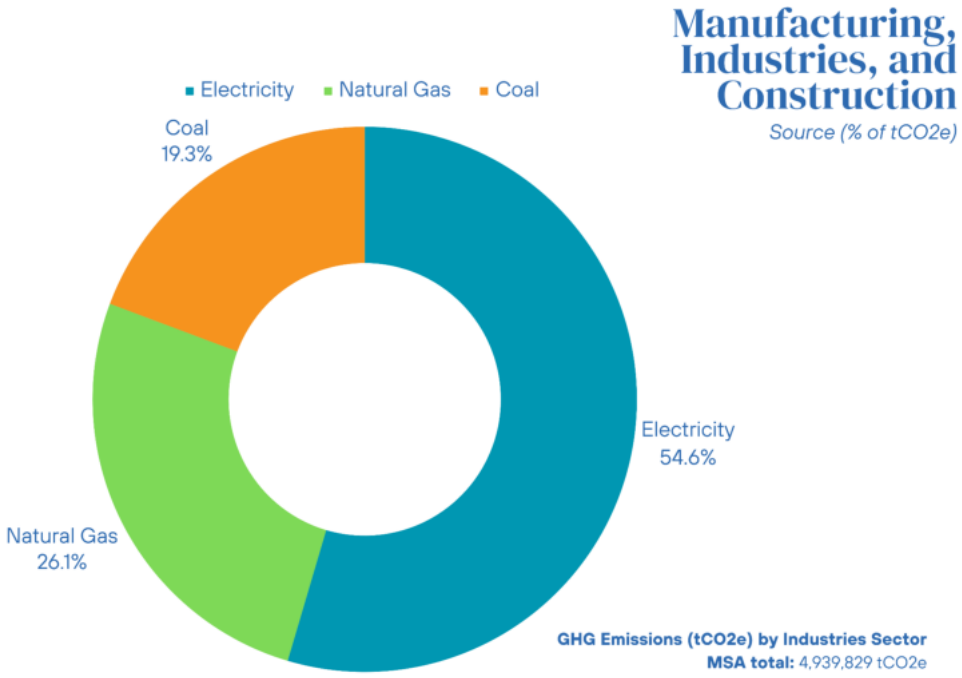

Figure 14: Percentage of GHGs emitted (tCO2e) from various fuel sources in the manufacturing, industry and construction sectors across the MSA.

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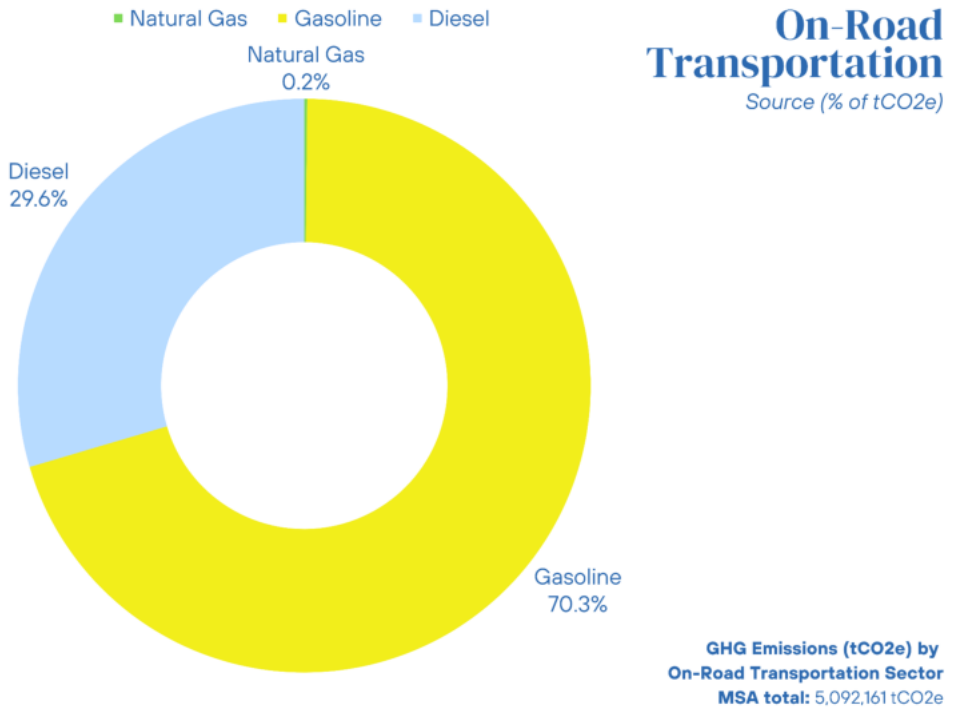


Figure 15: Percentage of GHGs emitted (tCO2e) from various fuel sources in the on-road transportation sector across the MSA.

2.2 GHG Emissions Reduction Targets

By Mayoral Executive Order and Council Resolution, Louisville has established a science based target of reducing GHG emissions by 50% by 2030 and achieving net zero emissions by 2040. As Louisville works towards these goals on a regional scale through CPRG, we look forward to extending the far reaching benefits of emissions reducing activities throughout the Louisville KY-IN MSA.

2.3 Low Income Disadvantaged Communities Benefits Analysis

Low-income and Disadvantaged Communities (LIDACs)
Climate change poses a significant threat to communities worldwide. Its impacts are not only environmental but socio-economic, with higher-income communities often better equipped to address the growing challenges. Vulnerable populations, already grappling with socioeconomic, health, and environmental burdens, bear a disproportionate share of the consequences. Low-income and Disadvantaged Communities (LIDACs) experience compounding effects of extreme weather events, heat, air quality, etc. that further amplify socioeconomic and environmental issues, and impede quality of life.

Where are LIDACs in the Louisville KY-IN MSA?
In exploration of the Louisville KY-IN MSA, the Justice40 Initiative has directed our efforts to examine local environmental concerns. The Justice40 Initiative is a data-driven, U.S. government effort aimed at addressing environmental and economic injustices across sectors. The central tenet of the initiative is to ensure that at least 40% of the overall benefits of certain federal investments, such as climate and infrastructure spending, reach disadvantaged communities. These disadvantaged communities are identified based on socio-economic factors- like income, ethnicity, and others, and compounding burdens- related to climate change, the environment, health, and economic opportunity. Census tracts identified as LIDACs are considered disadvantaged because they meet the criteria of at least one identified environmental burden AND criteria for associated socioeconomic factors.

Within the Louisville KY-IN MSA ninety-seven census tracts are identified as CEJST-identified LIDAC tracts. These tracts define the LIDAC areas for the proposed CPRG. Figure 16 depicts the spatial allocation of LIDACs within the project area.

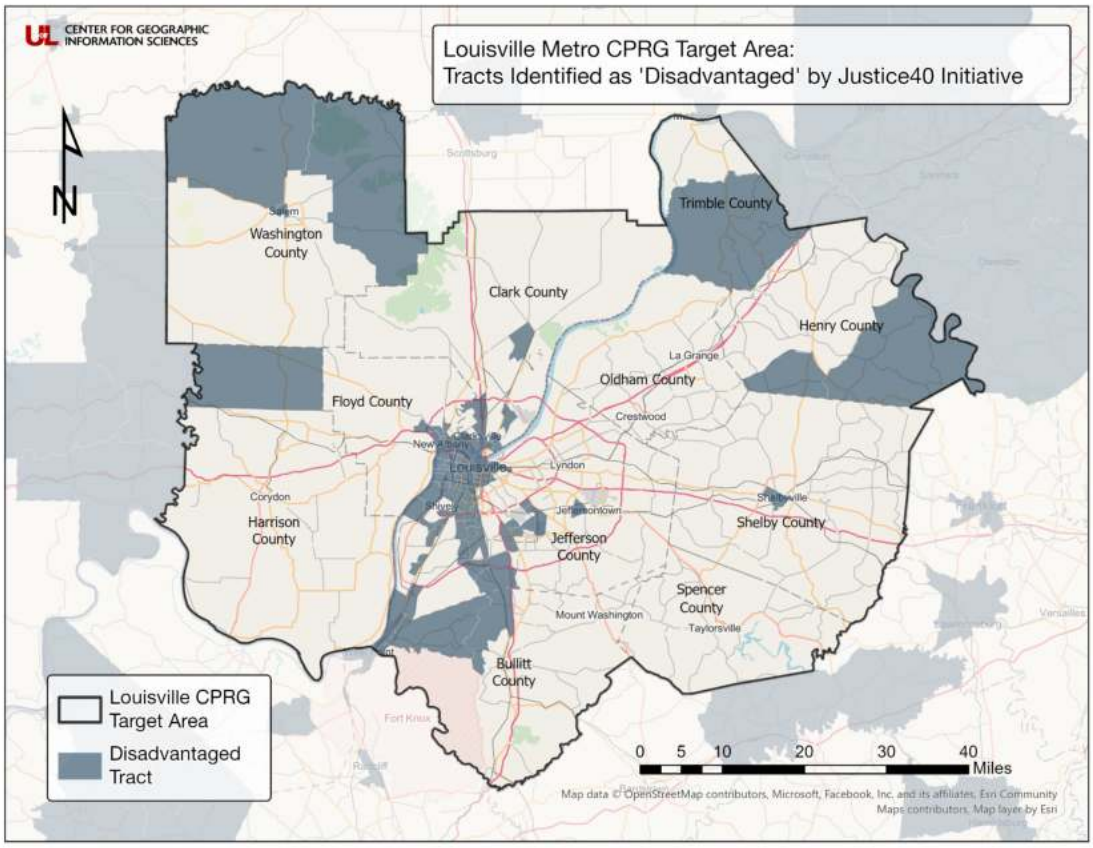


Figure 16: Disadvantaged (LIDAC) tracts identified using the CEJST.

The LIDAC tracts face combined environmental and economic challenges. Figures 17 and 18 illustrate and provide insight into socio-economic and demographic factors within the Louisville KY-IN MSA that inform CEJST-identified LIDAC designations.The indicators vary across areas within the Louisville KY-IN MSA, emphasizing the need for tailored approaches to engage communities and identify benefits tailored to the unique challenges of those living in the MSA's LIDACs.

For example, in the Shawnee neighborhood, associated with 6 northwest LIDAC tracts in west Louisville (shown in inset map in Figure 18). **A significant portion of Shawnee's population are people of color and economically disadvantaged (Figures 17, 18)**. The **proximity to potentially harmful waste facilities**, though below the 90th percentile, is a concern. While the count of Superfund sites is not extremely high, the specific site in proximity to this area, while no longer on the National Priorities list reflects historical environmental harms. There is also an **elevated number of risk management facilities** (above the 90th percentile), signaling heightened environmental hazards.

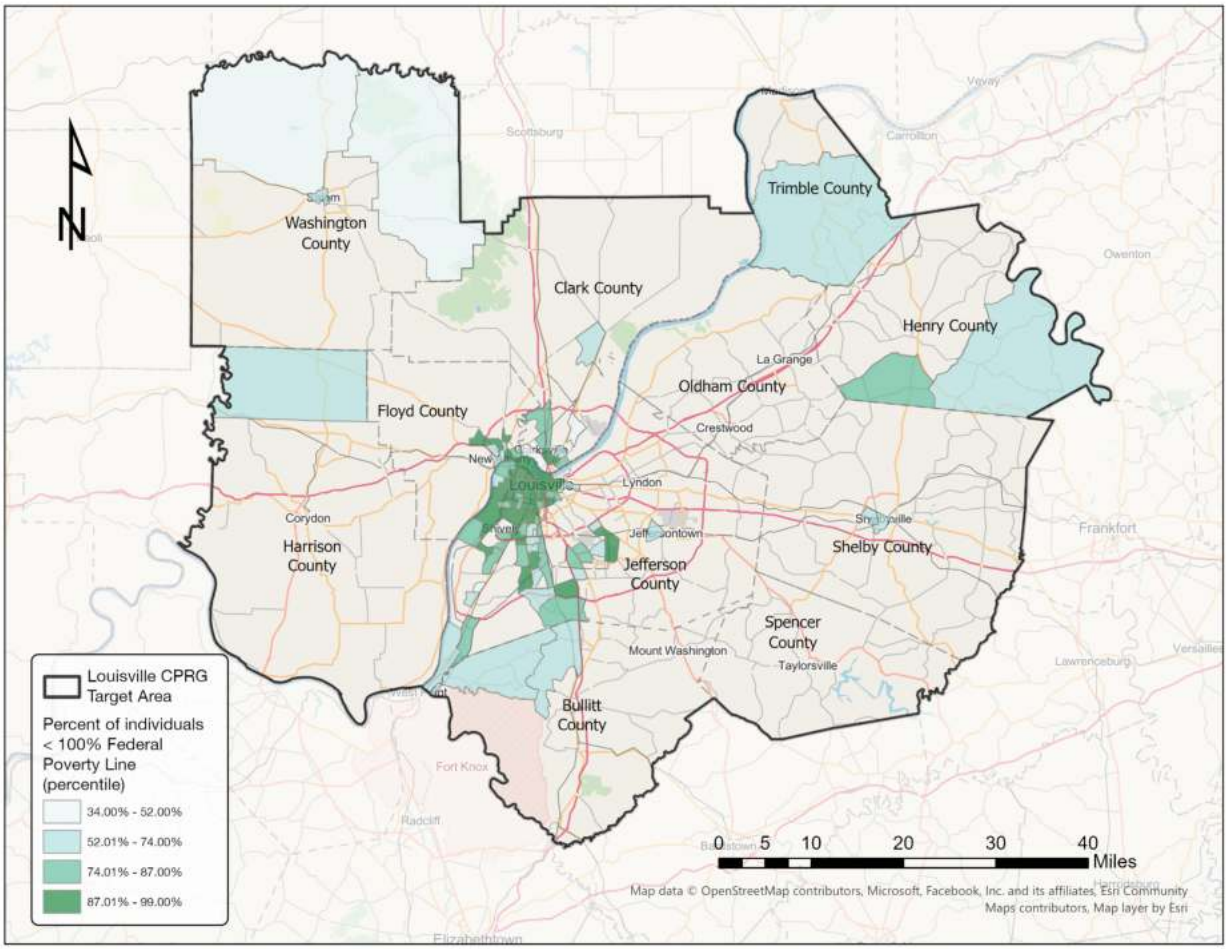


Figure 17: Disadvantaged tracts identified using the CEJST, depicting the percentage of individuals living below the federal poverty line, categorized by national percentile rank.

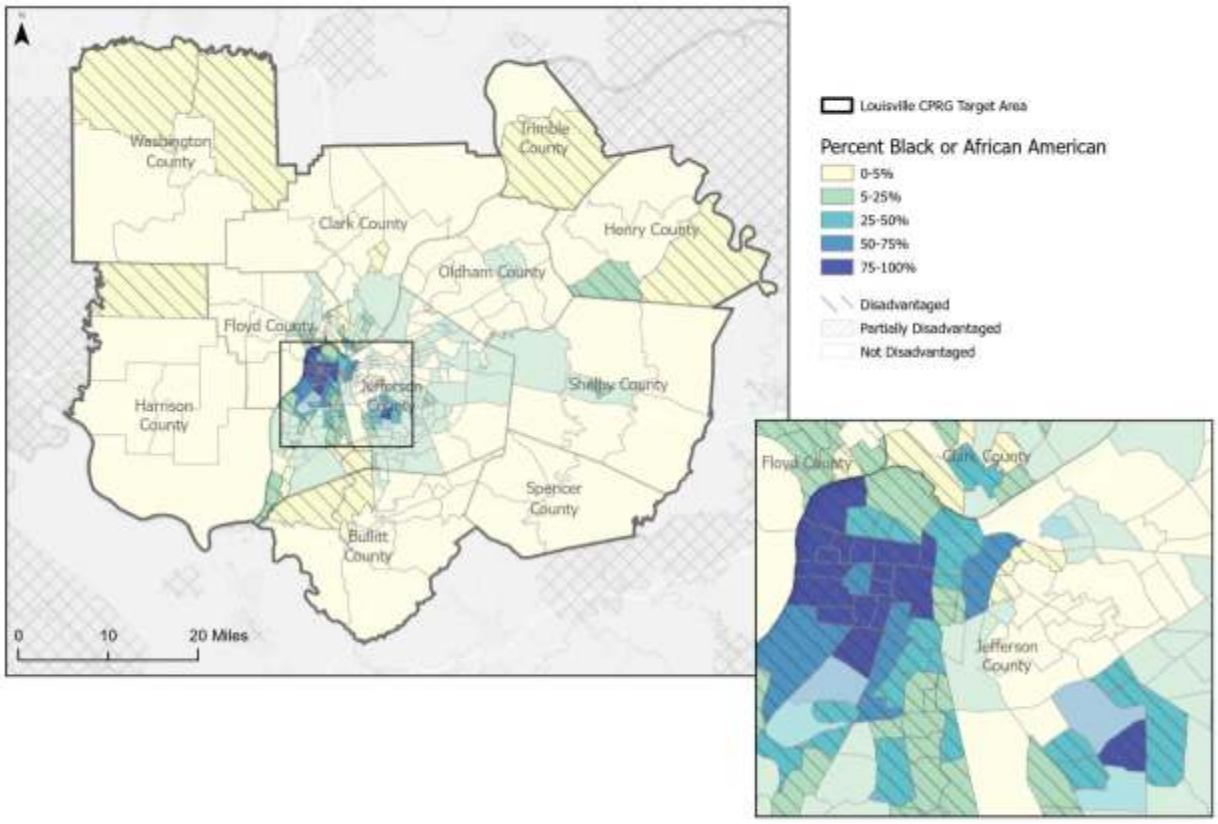


Figure 18: Percentage of Black or African American population in the Louisville KY-IN MSA, with CEJST-identified LIDAC tracts highlighted using hashes within the Louisville KY-IN MSA.

Our approach included identifying individuals who live within, represent, and/or serve LIDAC census tracts across the Louisville KY-IN MSA for semi-structured interviews. With firsthand insights into the lived experiences, concerns, and aspirations of community members, our analysis of the LIDAC tracts is grounded in the realities of those most affected by environmental and economic disparities. Prioritizing LIDAC resident and community input informs the greater arc of CPRG-funded initiatives. By directing benefits derived from CPRG-funded initiatives specifically within LIDACs, we can foster more inclusive and effective policies that benefit all members of society, promoting environmental justice and equity.

Identify LIDACs and Climate Impacts and Risks

Inequalities between these disadvantaged tracts and other tracts in the Louisville KY-IN MSA region make clear that climate and environmental harms already—and will continue to—affect individuals, communities, and ecosystems in these areas most prominently. In 2020, Louisville published a Climate Change Vulnerability[21] assessment that listed increasing disparities in utility costs, green space, damage to property, air quality declines and other factors as high vulnerabilities induced by climate change impacts such as extreme heat, severe winter storms, flooding, increased ozone formation, drought, storms, and more in our region. In Louisville/Jefferson County, for example, overall life expectancy has decreased by an average of two years in the last decade, from 76.8 years to a present average of 74.8 years. Where life expectancy fell most drastically, however, are located in these LIDAC tracts, with individuals in west

21 Louisville Metro Government/Geos Institute (2020). Climate Change Vulnerability in Louisville. https://climatewise.org/wp-content/uploads/projects/louisville/louisville-vulnerability-assessment-final.pdf

Louisville living **an average life span of 15 years less** than their much more affluent neighbors in East Louisville.[22]

These areas where life expectancy are lowest are also the areas where median incomes and the access to transportation needed to maintain steady income are lowest as well as where individuals with disabilities, individuals who are 65 years or older, individuals who rent instead of own, and individuals experiencing houselessness are highest. Houselessness in Louisville/Jefferson County increased by 48.6% from 2021 to 2022, with at least 3,319 students in Louisville/Jefferson County Public Schools (JCPS) experiencing housing insecurity. The percentage of renters in Louisville/Jefferson County also increased in the last four years by 11.6%, with over 40% of renters living in cost-burdened households who must spend more than 30% of their income to rent. Across Kentucky, 38.7% of renters live in severely cost-burdened households, spending more than 50% of their income on rent.[23]

We also know that the more rural counties in the Louisville KY-IN MSA around Louisville/Jefferson County experience similar increases in unhoused families, have low access to healthy food, difficulty accessing health care facilities, lack of reliable public transportation, and have high shares of cost-burdened households. These challenges were also reflected in the conversations we had with individuals from the rural counties.

In general, these disadvantaged tracts are also areas in which individuals experience high levels of housing insecurity compounded by multiple other forms of structural inequities. These communities are at greatest risk for displacement following extreme weather events that occur as a result of climate change. Extreme weather events are also becoming more frequent, with a 47% likelihood of a heatwave over 3+ consecutive days in this Louisville KY-IN MSA region. Issues of displacement and housing insecurity also stand to worsen given net-out climate migration predictions from sea-level rise. According to a 2017 study, Louisville/Jefferson County was likely to gain nearly 15,000 migrants due to climate change.[24] Risks to industrial areas from climate-related flooding, high heat, and extreme weather may result in potential loss of electricity that can be compounded by inadequate or absent emergency planning. The fenceline communities that surround these industrial areas face increasing risks of exposure to uncontrolled emissions or substances following extreme weather events.

22 Center for Health Equity, a Division of the Department of Health and Wellness, "An Invitation to Imagine - Transforming Power for Health Equity: Health Equity Report 2023," Louisville Metro Government. https://louisvilleky.gov/health-wellness/document/center-health-equity-executive-summary-2024

23 Heberle, L, R. Halpryn, S. Pruitt, S. Belinova, and L. Krauser, "2023 State of Metropolitan Housing Report: The State of Housing in a Changing Climate, Building Resilient Homes, Households, and Communities," University of Louisville, Metropolitan Housing Coalition, 2023, [pp. 17 -18; p. 24; p. 28; pp. 32-33] https://louisville.edu/cepm/pdf-files/state-of-metropolitan-housing-report-2023

24 Lauren C. Heberle, Kelly L. Kinahan, Alexandra Marie Peot, Brandon McReynolds, Adam Sizemore, and Steven Sizemore, "2017 State of Metropolitan Housing Report, The State of Affordable Rental in the Louisville Region," Metropolitan Housing Coalition, Louisville, KY. [pp. 6-9]. https://metropolitanhousing.org/wp-content/uploads/2020/10/2017SMHR_FINAL_Web.pdf

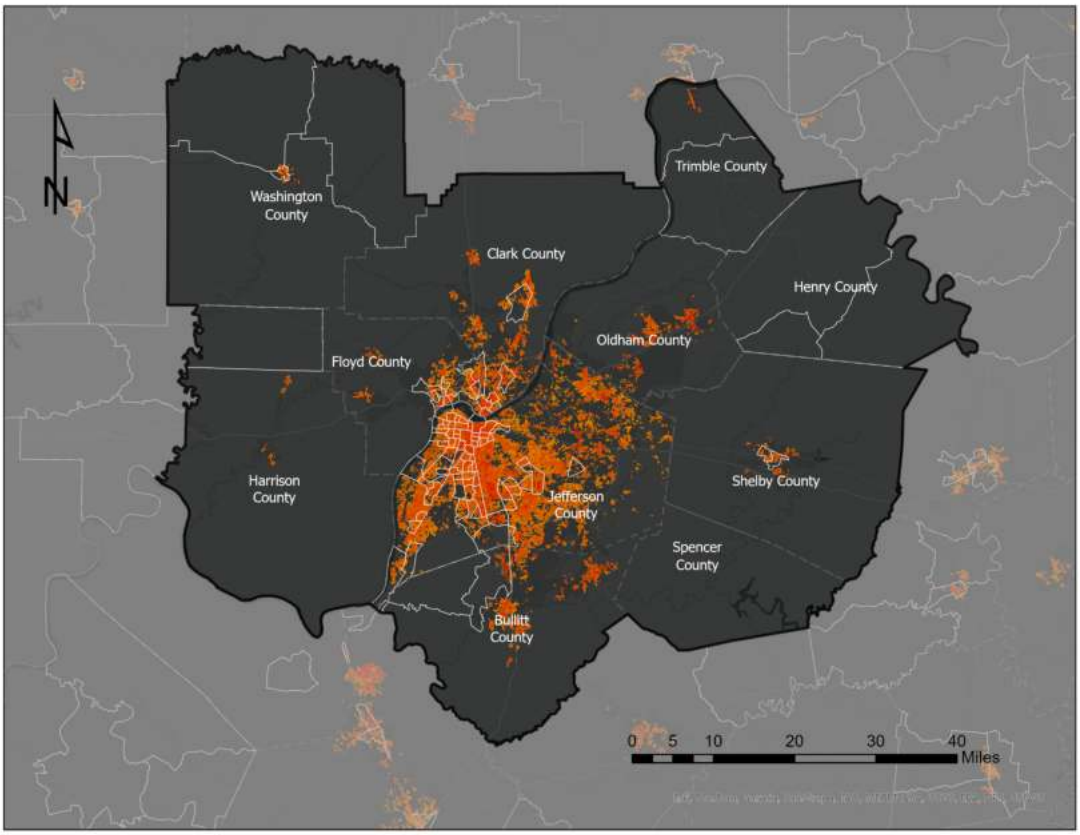


Figure 19: An urban heat severity index for the MSA region. Each pixel is shaded relative to its rank on a scale of 1 to 5, with 1 being a relatively mild heat area (slightly above the mean for the city), and 5 being a severe heat area (significantly above the mean for the city). J40 tracts in white outlines. Source: Trust for Public Lands.

Across all LIDAC areas in the Louisville KY-IN MSA region, cost of living promises to increase given the increase of utility and insurance costs to cover extreme weather conditions. As cost of living increases, access to basic needs and environmental benefits will be increasingly difficult. Worsening air quality will threaten clean breathing air. Worsening soil quality will threaten productive land, agriculture, and green space. Worsening floods will threaten the viability of living on the banks of the major waterways in the region.

Engage with LIDACs to understand community priorities

General Approach

Multiple forms of engagement were utilized to inform the PCAP's creation. In addition to general efforts for outreach and engagement across the 11-county Louisville KY-IN MSA, including through surveys and open community meetings (as explained earlier in the PCAP), specific engagement with LIDAC communities included: semi-structured, open-ended interviews with 44 key stakeholders representing or serving LIDAC tracts and intentionally seeking participation from historically under-resourced and under-represented communities on the NZAG.

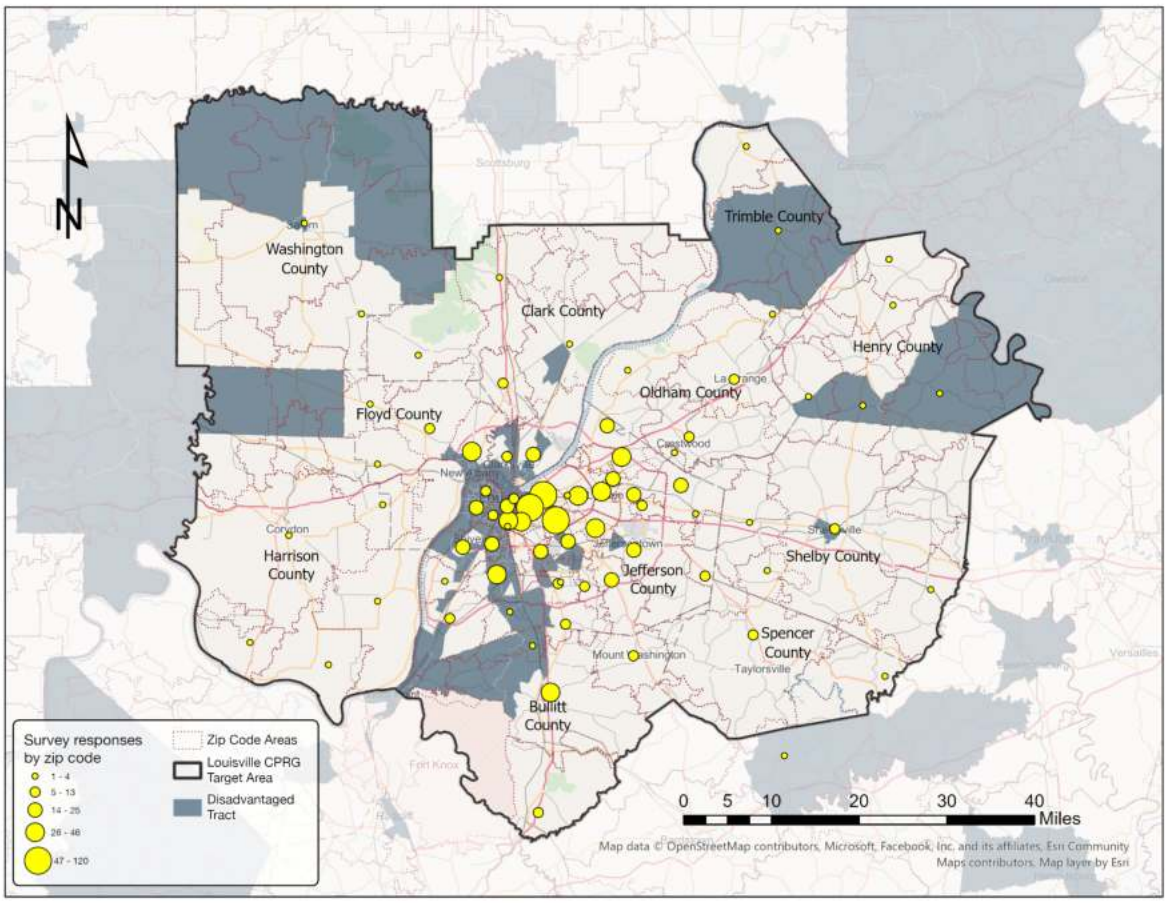


Figure 20: Results from our MSA-wide survey using graduated circles, highlighting CEJST-identified LIDAC tracts.

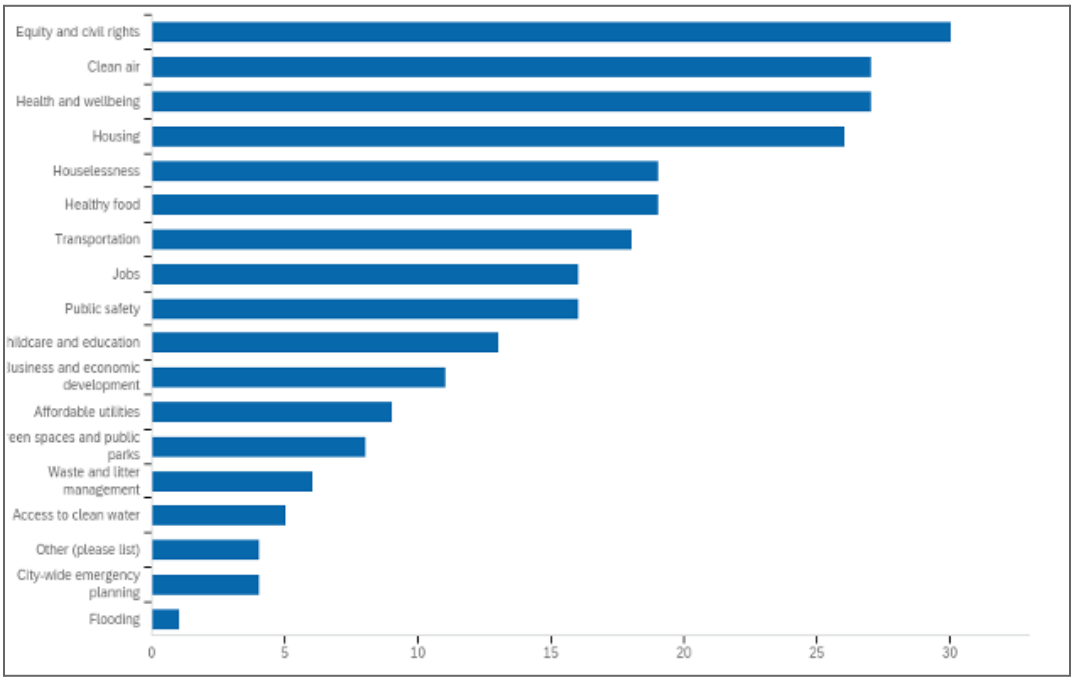


Figure 21: Survey results indicating top issues of interest for the MSA's future. The X-axis represents the number of respondents who selected the respective option as a priority.

LIDAC key stakeholder interviews utilized purposive sampling to reach key representatives of communities across the Louisville KY-IN MSA. This included existing contacts and newly identified stakeholders, and sought broad representation geographically, topically, and based on county- and LIDAC-tract specific characteristics, for example seeking input from agricultural sectors for rural areas of the Louisville KY-IN MSA and from leaders of Environmental Justice organizations in urban fenceline communities. Interviewees represented organizations focusing on a range of local social issues, including pollution reduction, food security, youth involvement, education, health and well-being, infrastructural expansion, local economies, agriculture, and elected officials, among others. Interviews were conducted with individuals representing organizations working in all counties within the Louisville KY-IN MSA with identified LIDAC census tracts (nine counties of the total 11 counties), and were completed within a four-week period in early 2024.

Summary of key stakeholder findings

To identify LIDAC community needs, this section draws from interviews conducted with 44 stakeholders representing community-based organizations, government agencies, residential groups, and other local-level key stakeholders from across the Louisville KY-IN MSA. Across these interviews, **several key themes emerged:** the significance of meeting basic needs for affordable and resilient housing, energy and food security, accessible transportation, fair and safe employment, and concerns about climate change impacts related to flooding, urban heating, energy costs and access, and compounding impacts on communities already experiencing environmental burdens. In survey responses from LIDAC communities, three top priorities and needs emerged: housing, transportation, and equity and civil rights. The findings below further capture and contextualize existing needs, climate action plan ideals, anticipated disbenefits from climate change solutions, and the desire for collaborative community conversations in the words, concerns, and ideas from our interviews with key stakeholders in LIDAC communities.

Existing Needs and Risks

Basic Needs: first create the foundation for sustainable and resilient housing by ensuring access to the environmental and social determinants of health, which include **affordable housing, affordable utilities, reliable public transportation, healthy food access, employment opportunities, and available childcare** in all local communities. Because these needs interconnect, difficulty accessing resources in one area result in individuals experiencing compounding, inequitable impacts. For example, in Louisville/Jefferson County, most economic employment opportunities are located in East Louisville, so residents in LIDAC communities in west Louisville require transportation to obtain those jobs. In rural areas, compounding effects often result in rural isolation–for students, lack of transportation results in fewer after-school educational opportunities, limited internet access, and for households, lack of transportation results in an inability to access social services.

Flooding: how to assess risk and mitigation efforts for increased likelihood of extreme weather flooding events, with special emphasis from communities in urban areas experiencing aging infrastructure and from rural communities in Bullitt, Floyd, Clark, and Harrison Counties.

Planning and Zoning: consider the role of density in planning, address poor development work, address the lack of code enforcement, especially the lack of building code enforcement in rural areas, and train local people how to meet regulations.

Heat Impact: in areas with sparse tree canopies, cooling centers, pools, shelters, and supported greening programs that provide shade and/or reduce heat-absorbing expanses of concrete are needed.

Environmental educational opportunities: programming and resources to educate and engage public audiences around topics such as agriculture, food access systems, land stewardship, natural resources, recreation and other tourism-based endeavors are necessary.

Climate Action Plan Ideals

Regulation of Polluting Industries: reduction of GHG emissions can only occur if major polluters are regulated and held accountable to environmental standards. Multiple scales of regulation–at the local, state, and federal level–are required, and public audiences must be made aware of the daily and cumulative exposure risks from polluted air, water, and soil. Across Southern Indiana and Louisville/Jefferson County, but localized especially in west Louisville, odor issues remain a major health concern.

Micro-Regional Approach: this diverse region of urban and rural communities requires engagement and project implementation plans tailored to each unique local–such localized efforts would help to acknowledge regional independence and promote self-efficacy toward enacting climate solutions in communities.

Anticipated Disbenefits from Climate Change Solutions

Increased Cost of Living: improvements to housing can increase property values and property taxes, which risks pricing residents out of their home communities. Increased insurance costs and renovation fees due to extreme weather events further add to housing and basic needs costs.

Prioritizing Homeowners: climate solutions, such as solar incentive programs, often benefit homeowners and can result in increased rental rates for residents already experiencing housing insecurity.

Collaborative Community Conversations

Trusted Facilitators: community organizations are already having robust conversations about climate concerns and solutions–creating synchronicity with existing, ongoing programming, rather than creating new events for these conversations with LIDAC communities is ideal. Conversations around implementation efforts should be community-led, should reflect the racialized makeup of that community, should promote relationship-building between residents, LMG, and industry, should be run by trained, local facilitators–funded jobs may be created to ensure ongoing community conversation efforts. To build trust and establish believability that climate solutions will be implemented, consistent communication around timeline and intentional follow-through on small scale solutions is important.

Timing / Location: community meetings must be offered at multiple times, locations, and modes in order to promote attendance. Locations should include trusted community areas, such as YMCAs, houses of worship, and community centers, neutral areas, such as schools and libraries, or other places where residents frequently gather. Individuals should have options for attending meetings online, but meetings should never be exclusively in-person or exclusively virtual. When meetings are virtual, creative approaches to ensure broad participation are important.

Access: support that makes it easier for people to meaningfully engage in interactive meetings should be prioritized, such as providing locally-sourced childcare, locally-sourced food, free transportation to and from events, and incentives or raffles for attending. Reducing barriers of access to information is a prerequisite for community conversation, which entails removing all jargon, visualizing data, translating text into multiple languages, providing ASL and verbal translation services. Promoting events through a multiplicity of outreach efforts–canvassing, social media, radio, television, newsletters, phone calls, etc. would help ensure that most individuals feel included in these community conversations.

Intergenerational: invite youth and elderly people into conversations that are often directed toward adult learners, and provide the educational materials needed to engage with ideas richly and creatively. Overall, residents who live in LIDAC tracts agree that because so much need is present now, **this PCAP should not ignore "now" in planning efforts for the future.** To help envision this future together, shared language and terminology that resonates across rural and urban communities is necessary. For example, some areas are more likely to talk about "extreme weather impacts" rather than "climate change."

While the PCAP phase has included a strong focus on LIDAC community engagement and qualitative analysis, further quantitative analysis will be expanded upon during the CCAP.

3. Priority GHG Reduction Measures

3.1 Measure 1: RESIDENTIAL ENERGY UPGRADE PROGRAM

Residential Building Sector Emissions (Baseline):

- 18.9% of MSA emissions
- 6,410,939 metric tons CO2e

Description:

To rapidly advance GHG reductions in the residential sector, we have combined a range of actions that target the delivery of swift, achievable improvements in the energy performance of existing homes and new builds, with the goal of bringing these buildings as close as possible to net zero or zero energy ready standards. The scope of this work will include single family, multifamily, manufactured and modular housing, and other diverse housing types. Further, we will utilize innovative financing to incentivize energy measures as well as more responsible land use strategies such as infill development, transit oriented development, conversions of vacant offices to residential or mixed use, adaptive reuse of historic buildings, utilization of brownfields, and more. Significant action in this area will require an expanded skilled workforce to support delivery. We will work with LIDAC communities across the Louisville KY-IN MSA to develop an appropriately trained workforce, create employment opportunities, and enhance local supply chains.

Actions:

Action R1: Leverage bulk-purchasing – Building on the success of LMG's regional Solarize bulk purchasing program that currently serves 7 of the Louisville KY-IN MSA counties, create a broader energy efficiency-focused multi-year education and implementation campaign. The campaign will include the following components: robust public education about energy efficiency best practices, incentives for behavior change, vetting contractors and leveraging bulk-purchasing power to negotiate wholesale discount pricing for all participants, streamlined application process for residents to be matched with a vetted provider and complete energy upgrades.

Action R2: Financial assistance for residential energy upgrades - While R1 would facilitate an easy process for residents to invest their own resources in energy projects, R2 recommends the creation of a financial assistance program, administered through a green bank, to reduce the cost of energy measures such as energy efficiency and solar photovoltaics. Interventions may also include targeted urban heat reduction strategies such as expanding cool roofs and tree planting initiatives. Innovative financing tools will prioritize LIDAC households and responsible land use patterns. LIDAC focused energy programs will be delivered in partnership with existing utility rebate and assistance programs.

Action R3: Equitable workforce and business development - To support implementation of the above actions, we seek to create an equity-focused training and skills transfer program. We will work with workforce development and community organizations across the Louisville KY-IN MSA to emphasize barrier removal, recruitment, and workforce training programs prioritizing LIDAC communities. To supplement this effort, we will offer business development support (with attention to minority owned businesses) to enable local emerging businesses to participate in LMG's bulk purchasing bids.

Estimated quantifiable GHG emissions reduction

- 2025 – 2030: 764,071 metric tons CO2e
- 2030 – 2050: 3,820,357 metric tons CO2e

Note: Estimated GHG reductions include projections based on project proposals received from potential co-delivery/ co-financing partners. At this time, no firm agreements are in place.

Implementing agency or agencies

- **R1:** LMG in partnership with energy services installation partners, housing agencies, developers, and community organization
- **R2:** LMG through its Green Bank development finance agency in partnership with energy utilities (Louisville Gas & Electric, Duke, and other rural electric utilities)
- **R3:** LMG in partnership with regional workforce development organizations, technical colleges, trade unions, industry associations, etc.

Milestones for obtaining implementing authority, as appropriate

None required for R1 and R3. For R2, LMG will enable financial incentives/lending for the entire Louisville KY-IN MSA by exercising a combination of: 1) its existing authority and loan programs; 2) collaboration with regional partners to administer lending; and/or 3) establishing authority through a new entity as necessary.

Implementation schedule and milestones

- Months 1-4: Program planning
- Months 5-8: Procurement and contracting
- Months 8-60: Action R3
- Months 9-60: Action R1
- Months 12-60: Action R2

Geographic location or scope

- Entire Louisville KY-IN MSA

Funding sources

- Existing energy audit, weatherization, and energy upgrade programs through utilities
- IRA tax credits
- Existing construction and electrical training programs
- Received and pending federal grants from the U.S. Department of Energy and EPA

Metrics for tracking progress

- Number of homes participating
- Percent of total households participating
- Location and demographics of participating households
- Conversion rates of participating households implementing measures
- Energy usage and bill reductions from implementing measures
- Private financing leveraged

- Workers trained and % LIDACs participating
- Percent of minority owned businesses contracted

LIDAC benefits
Snapshot:

- Reduced energy costs for households
- Reduced air pollution from regional fossil-fuel electric generating units
- Improved skills and employment opportunities for LIDAC communities
- Anti-displacement guardrails will be built into these programs to protect homeowners and tenants

Projects to reduce emissions from residential buildings have the potential to provide immediate health, well-being, and economic benefits to LIDAC communities. To achieve GHG reductions in the residential sector we have combined a range of action measures that target delivery of swift achievable improvement of energy performance in existing homes. Significant action in this area will require an expanded skilled workforce to support delivery, and expanding labor needs in the field of renewable energy generation and installation can be channeled to individuals within LIDAC communities through local training programs across the MSA, which would create employment opportunities and enhance local supply chains.

R1: This program will include targeted awareness, education, information, school and community events tailored to address the needs and opportunities of different groups in ways that raise understanding and ability to take swift, affordable, and appropriate energy efficiency actions.

R2: Residents of LIDAC communities face significant existing energy burdens. Figure 22 shows energy burden as a percentage of household income, demonstrating the need for both rural and urban residents of the Louisville KY-IN MSA to receive support for reliable, long-term utility cost reductions as can be achieved through energy efficiency modifications and residential solar installations. A recent program to provide financial support for the installation of residential solar photovoltaic systems on the homes of low- and moderate-income households in the Louisville KY-IN MSA has been shown to reduce household energy costs,[25] providing economic benefits and increased energy security to owners who might face economic pressures of increasing costs and/or patterns of displacement due to gentrification. Supporting the future installation of energy efficiency modification and residential solar systems on new affordable housing units, including work to ensure benefits will reach tenants, can also lead to the creation of more resilient housing that provides manageable utility costs. Figure 23 shows that residents of rural LIDACs are already likely to be heating their homes with electric sources, and thus will have year-round economic benefits from solar installations. For urban residents, a focus on natural gas will mean the need for additional efforts to ensure seasonal heating expenses are also mitigated by investment in residential solar.

Urban cooling efforts, including supported urban forestry and creation of expanded green spaces especially in LIDAC communities, can provide immediate health and well-being benefits to residents. As Figure 19 shows, the urban heat island effect is significant for LIDAC communities in West and South Louisville/Jefferson County, but is an issue across the urban core of the Louisville KY-IN MSA.

[25] Angela D. Storey, David A. Johnson, Jordan Chatellier, Lauren Heberle, and Allison Smith (2023). Community Participation, Experiences, and Perceptions of the Solar Over Louisville Solarize Program, 2022-2023. A Technical Report prepared for Louisville Metro Government.

R3: We will work with LIDAC tracts across the Louisville KY-IN MSA to focus training and skills transfer activities on these communities to increase good quality employment opportunities for local residents in ways that support local business start-ups. In addition to the above action measures, providing support for expanded local planning work and zoning enforcement in the Louisville KY-IN MSA's more rural areas can also offer avenues for more sustainable development, which offers short-term and long-term benefits in job opportunity, growing local economies, and retaining populations in rural areas.

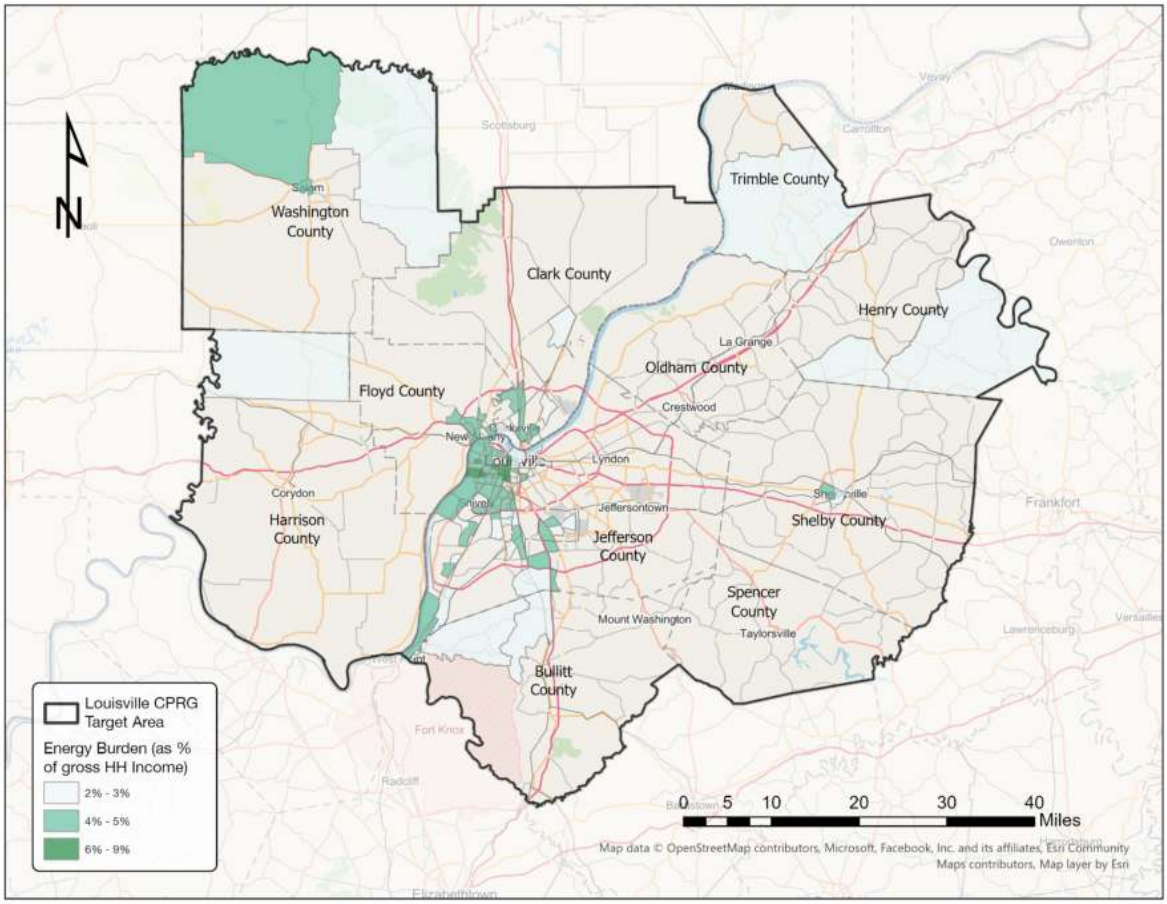


Figure 22: Energy burden as a percentage of household income within CEJST-identified LIDAC tracts.

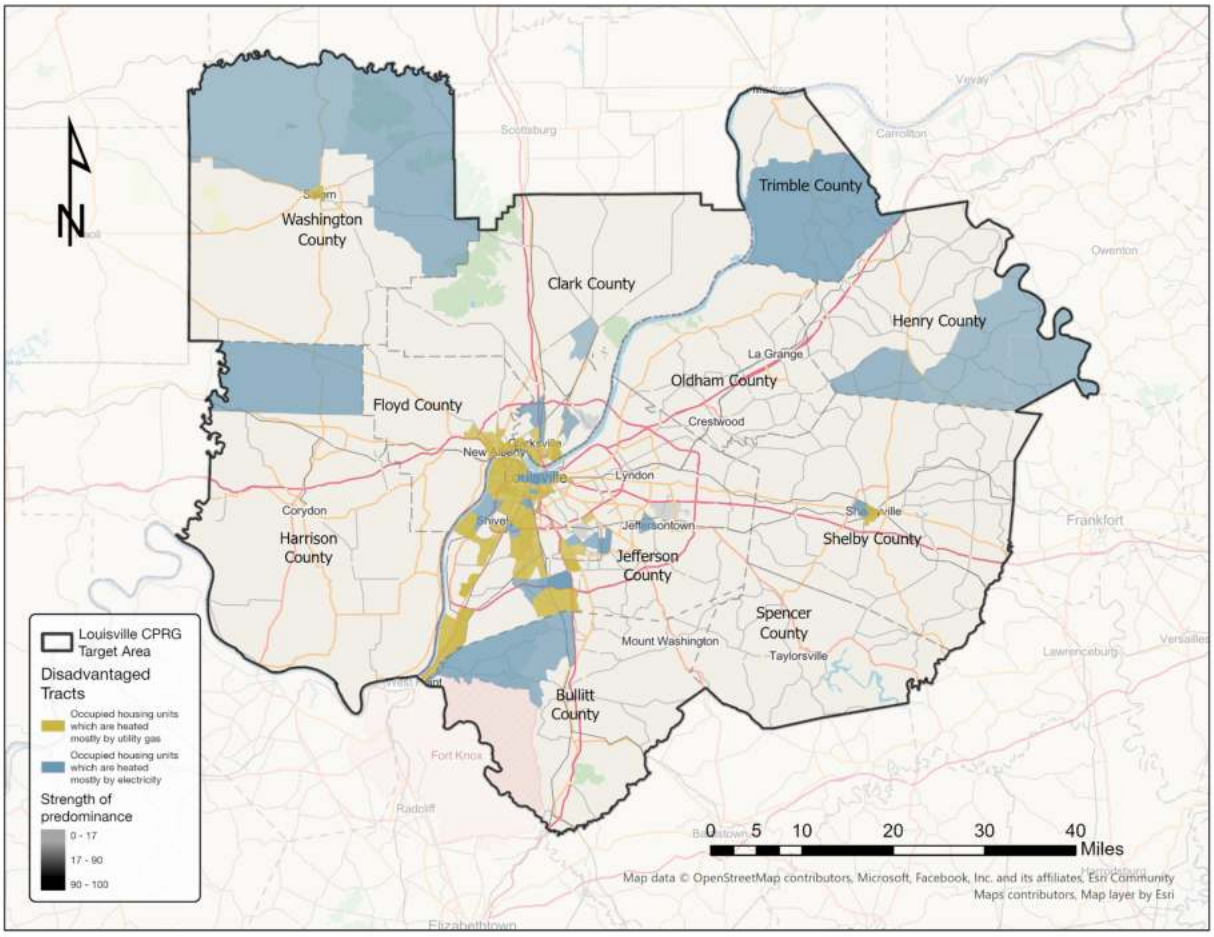


Figure 23: Occupied housing units within CEJST-identified LIDAC tracts heated by utility gas or electricity, with opacity indicating the strength of predominance.

3.2 Measure 2: COMMERCIAL/INSTITUTIONAL ENERGY UPGRADE PROGRAM

Commercial Buildings Sector Emissions (Baseline):

- 14.5% of Louisville KY-IN MSA Emissions
- 4,939,829 metric tons CO2e

Description:

To accelerate ambitious GHG reductions in the commercial/institutional sector, we propose a range of actions to quickly and flexibly deploy clean energy, energy efficiency, and workforce programs at scale. Firstly, we will provide an innovative and complementary combination of data management, technical assistance, and financial assistance to accelerate the deployment of energy efficiency and clean energy projects. The financing tool can also incentivize more responsible land use strategies such as infill development, transit oriented development, conversions of vacant offices to mixed use, adaptive reuse of historic buildings, utilization of brownfields, and more. Additionally, we will make investments in large scale GHG reducing projects of institutional and community significance. Finally, to support this transition, we will invest in the creation of a skilled workforce that is inclusive of LIDACs.

Actions:

Action C1: Opportunity mapping and voluntary benchmarking program - To assist in effective targeting of buildings in greatest need of upgrades, we will create an energy use/GHG emissions "heat map" of commercial and institutional buildings across the Louisville KY-IN MSA, utilizing satellite data and other sources. This will be supported by a voluntary building benchmarking program to improve awareness, assist in identifying targeted efficiency measures and candidates for energy efficiency incentives, and tracking progress over time.

Action C2: Energy advisory service - We will create an energy advisory service that will provide expert advice on energy efficiency and renewable energy technology measures for commercial and institutional buildings and facilities; including personalized navigation of financing, incentives, and developing innovative new financing structures. This will include the creation of a Green Bank that will seek to leverage significant additional financing for GHG reduction projects from external funders and other funding mechanisms.

Action C3: Financial assistance for energy upgrades - C2 will be paired with an incentive program that provides financial assistance for the completion of energy efficiency, clean energy, and other GHG reduction efforts. Interventions may also include support for an expanded cool roofs program and tree planting to reduce heat island effects in targeted areas. The assistance program will prioritize LIDAC communities and responsible land use strategies. Engagement across the sector suggests strong opportunities for co-delivery with partners in logistics, public services, education, leisure, and healthcare. The advisory service will verify significant reductions to qualify projects for incentives.

Action C4: Utility scale solar - To lead by example and make a leap towards established goals, a utility scale solar project will help LMG take a significant step towards achieving its goal of 100% clean electricity by 2030.

Action C5: Equitable workforce and business development - We will provide training and skills transfer to support implementation of actions 1, 2, and 3, with a focus on LIDAC barrier removal and business development.

Estimated quantifiable GHG emissions reduction

- 2025 – 2030: 605,759 metric tons CO2e
- 2030 – 2050: 3,028,795 metric tons CO2e

Note: Estimated GHG reductions include projections based on project proposals received from potential co-delivery/co-financing partners. At this time, no firm agreements are in place.

Implementing agency or agencies

- **C1 -** Contractor with LMG OS oversight
- **C2 -** Contractor with LMG OS oversight
- **C3 -** LMG, through its development finance/green bank agency
- **C4 -** LMG in partnership with LG&E
- **C5 -** LMG in partnership with regional workforce development agencies, technical colleges, trade unions, industry associations, etc.

Milestones for obtaining implementing authority, as appropriate

None required for C1, C2, and C5. For C3, LMG will enable financial incentives/lending for the entire Louisville KY-IN MSA by exercising a combination of: 1) its existing authority and loan programs; 2) collaboration with regional partners to administer lending; and/or 3) establishing authority through a new entity as necessary. For C4, LMG and LG&E will seek appropriate Kentucky Public Service Commission approval.

Implementation schedule and milestones

- **Months 1-10:** Action 4
- **Months 1-4:** Program planning
- **Months 5-8:** Procurement and contracting
- **Months 8-60:** Actions 1 and 5
- **Months 10-60:** Actions 2 and 3

Geographic location or scope

C1, C2, C3, and C5 - Entire Louisville KY-IN MSA
Action C4 - To be confirmed (within Louisville KY-IN MSA)

Funding sources (if relevant)

- Co-financing leveraged by relevant developer/property owners
- Regional development finance incentives
- Inflation Reduction Act incentives
- Local Property Assessed Clean Energy financing (Energy Project Assessment District)
- Local or regional rebates such as the Cool Roof Incentive Program
- Action 4 co-financed by LMG budget (pending Metro Council approval)

Metrics for tracking progress

- Number and square footage of participating properties
- Energy usage and bill reductions, Energy Use Intensity reductions
- Location and LIDAC status of participants
- % of energy advisory recipients implementing emissions reduction actions
- Financial assistance amount and co-investment ratio
- Number of trainees and LIDAC representation
- kWh of solar energy generated compared to energy used for C4

LIDAC benefits

Snapshot:

- Reduced air pollution from regional fossil-fuel electric generating units
- Energy cost savings for LIDAC commercial/institutional property owners
- Quality jobs and entrepreneurship opportunities for LIDACs in the energy services industry

See combined LIDAC benefits for Measures 2 and 3 under Measure 3.

3.3 Measure 3: INDUSTRIAL EFFICIENCY PROGRAM

Industrial Sector Emissions (Baseline):
IPPU (Industrial Processes and Product Use)

- 20% of Louisville KY-IN MSA Emissions
- 7,023,995 metric tons of CO2e

Manufacturing Industries and Construction

- 14.6% of Louisville KY-IN MSA Emissions
- 4,939,829 metric tons of CO2e

Description:
To boost meaningful GHG reductions in the industrial sector, this set of actions will identify customized solutions and incentives that address the unique needs of our industries. The range of actions under this measure will address industrial processes and facilities through operational improvements, process energy efficiency measures, switching away from carbon intensive fuels, renewable energy generation, and more. We will work in partnership with industrial organizations to identify and implement ambitious, swift, affordable, and appropriate opportunities to reduce carbon emissions at speed and scale. The program will include a built-in equity-focused oversight process to ensure LIDAC benefits are maximized.

Actions:

Action I1: Energy/GHG advisory service - Creation of an energy/GHG reduction advisory service that will vet and/or provide expert advice on ambitious initiatives energy efficiency, clean and renewable energy, and GHG emissions reducing measures for industrial processes and facilities, including tailored navigation of financing, incentives, and creating innovative financing structures.

Action I2: Financial assistance for GHG measures with verification and community oversight: The energy/GHG advisory service will be paired with an incentive program that provides financial assistance for the completion of energy efficiency, clean energy, and other GHG reduction efforts. Projects may include renewable energy, energy efficiency, fuel switching, industrial process and equipment upgrades, etc. This action will also include creation of a Green Bank that will seek to leverage significant additional financing for GHG reduction projects from external funders and other funding mechanisms. Engagement across the sector suggests strong opportunities for co-delivery with partners in manufacturing, chemicals, and the distillery sector. The above advisory and incentive service will be supported by a community advisory board. Representatives from directly impacted communities will be compensated for their time and expertise to ensure projects meet satisfactory GHG and community benefits to build trust and accountability into the process.

Estimated quantifiable GHG emissions reduction

- 2025 – 2030: 864,387 metric tons of CO2e
- 2030 – 2050: 4,321,937 metric tons of CO2e

Note: Estimated GHG reductions include projections based on project proposals received from potential co-delivery/co-financing partners. At this time, no firm agreements are in place.

Implementing agency or agencies

- **I1 -** Contractor with LMG's OS oversight
- **I2 -** LMG, through its lending agency/partners and in partnership with contracted energy service providers, community advisors, and industries.

Milestones for obtaining implementing authority, as appropriate

None required for I1. For I2, LMG will enable financial incentives/lending for the entire Louisville KY-IN MSA by exercising a combination of: 1) its existing authority and loan programs; 2) collaboration with regional partners to administer lending; and/or 3) establishing authority through a new entity as necessary.

Implementation schedule and milestones

- **Months 1-4:** Program planning
- **Months 5-8:** Procurement and contracting
- **Months 11-60:** I1 and I2

Geographic location or scope

Entire Louisville KY-IN MSA

Funding sources (if relevant)

- Co-financing by industrial participants
- Inflation Reduction Act incentives

Metrics for tracking progress

- Number and locations of participating properties - in both the energy advisory service and financial assistance programs
- Conversion rates of applicant participants receiving financial assistance and completing implementation
- $/tonne of CO2 reduced through financial assistance program
- Net energy reductions by participants
- GHG emissions reductions by industrial processes and facilities
- Representation of LIDAC advisory participants

LIDAC benefits

Snapshot:

- Reduced air pollution from regional fossil-fuel electric generating units
- Reduced co-pollutants in LIDAC areas

See combined LIDAC benefits for Measures 2 and 3 below:

With the disproportionate siting of industrial and commercial areas around LIDAC communities, especially in the Louisville KY-IN MSA's urban core, these communities already face high environmental burdens from air, water, and soil contamination. While switching energy sources will only alleviate local impacts of fossil-fuel based energy production on-site, decarbonization efforts across the electrical grid and industrial processes can provide region-wide benefits from lowered emission of GHG and co-pollutants around electricity generation and industrial sites.

Commercial and industrial emissions reduction programs can also provide opportunities for jobs to LIDAC communities through the creation of significantly expanded workforce needs in this area.

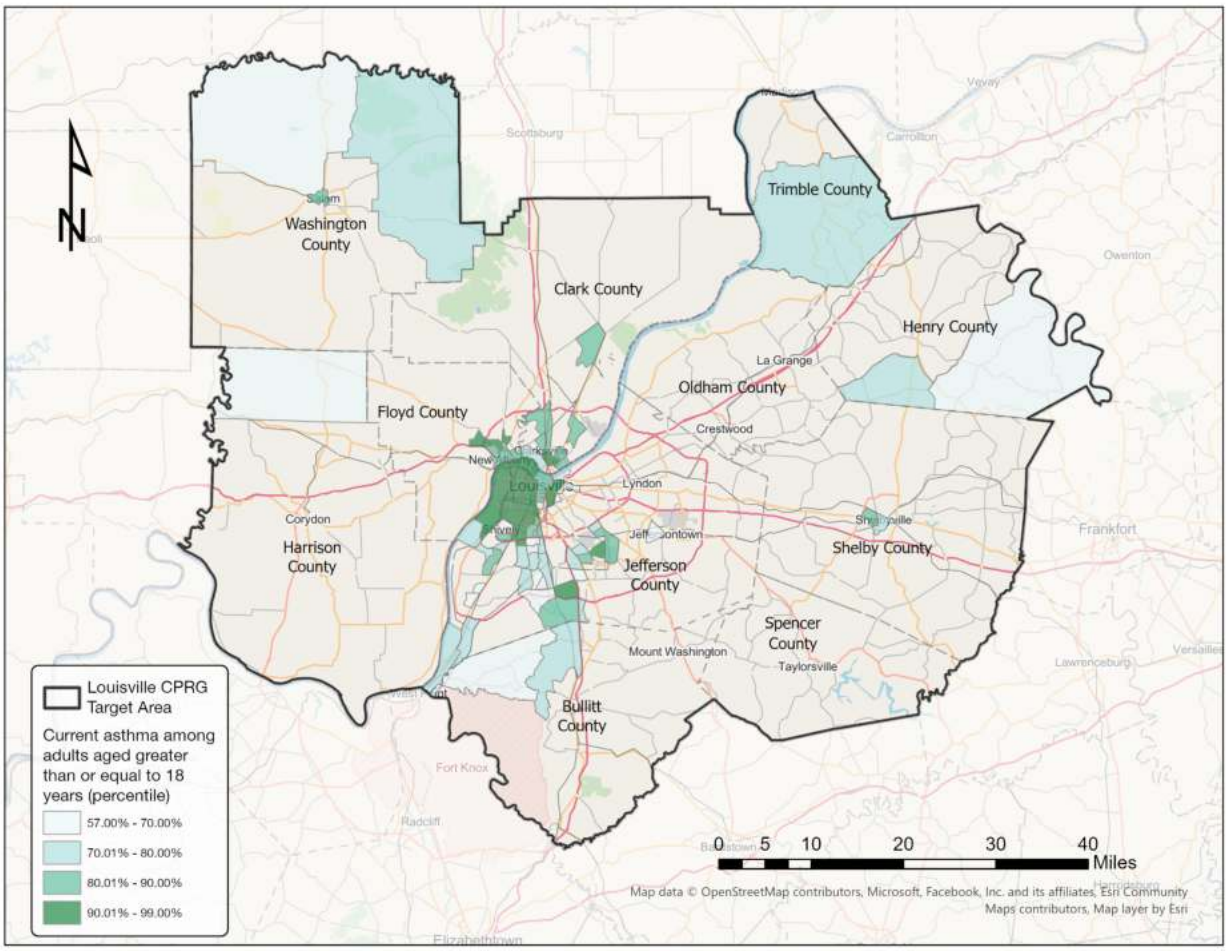


Figure 24: Asthma rates among adults 18 or over, categorized by national percentile rank.

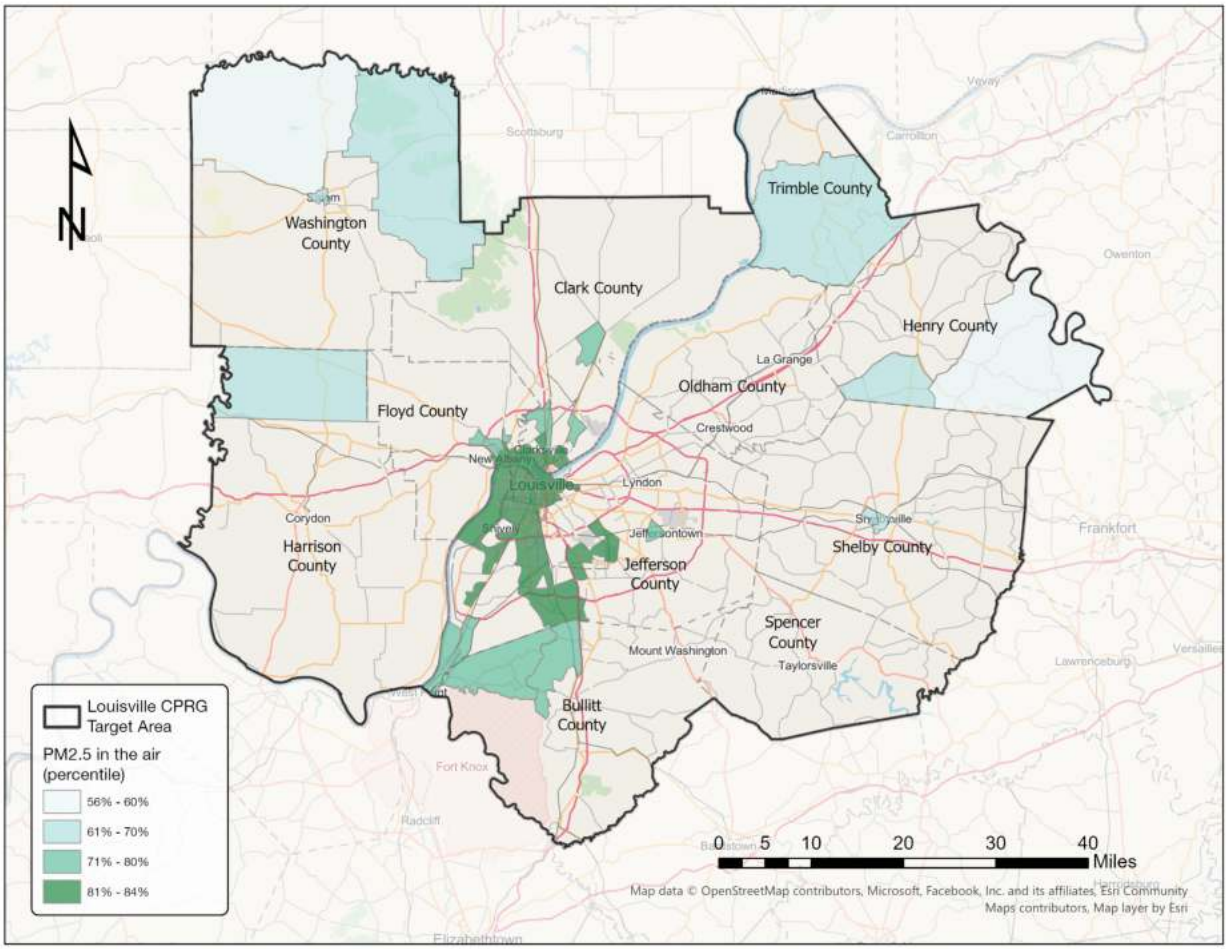


Figure 25: Distribution of particulate matter greater than 2.5 in the air, categorized by national percentile rank.

3.4 Measure 4: TRANSPORTATION MODAL SHIFT PROGRAM

Transportation Sector Emissions (Baseline):
On-Road Transport Sectoral Emissions:

- 15% of Louisville KY-IN MSA emissions
- 5,092,161 metric tons CO2e

Description:
To achieve transformative and sustained GHG reductions in the transport sector, we have combined a range of actions that shift our highly car dependent region towards more sustainable transportation alternatives, including transit and connected active transportation. The transportation modal shift program will not only reduce emissions by replacing car trips at scale, but will also provide residents, especially LIDACs, with improved access to essential services, jobs, housing, education, entertainment, etc. at lower costs. It will also promote positive health outcomes through direct improvements in air quality and opportunities for safe active living

Actions:

Action T1: Invest in public transport: Improve frequency, quality, and therefore ridership of TARC services, in particular for high demand routes, by investing in more efficient buses, operational capacity, and simplified, reduced, and/or free fares for LIDACs. The combination of increased frequency and simplified attractive fare structures would reduce emissions, expand access to transit and opportunity for LIDAC communities, and induce modal shift from single-occupancy vehicles to transit. Simultaneously support TARC's ability to maintain a high quality of service long term. We will explore pairing this effort with existing vanpool programs to further extend the impact of these investments to more communities.

Action T2: Enhanced last mile connectivity through active transportation: Expand resources to regional Complete Streets programs to more quickly build out infrastructure that makes transit connected streets and high-use areas more walkable, bikeable, safe for use by all residents including the elderly, children, and differently abled, as well as calm traffic. Measures can include road rightsizing, new sidewalks, speed humps, signage and road markings, bus stop improvements, planters and green infrastructure, etc.

Action T3: Bicycle and e-bike rebates: Provide point of sale rebates in partnership with local bike shops that can be applied to either bicycles or low-speed e-bikes to encourage modal shift, and prioritize LIDAC communities.

Estimated quantifiable GHG emissions reduction

- 2025-2030 70,348 MT CO2e
- 2030-2050 351,740 MT CO2e

Note: Estimated GHG reductions include projections based on project proposals received from potential co-delivery/co-financing partners. At this time, no firm agreements are in place..

Implementing agency or agencies

- **T1 -** TARC, in partnership with LMG, public schools, employers, and community organizations
- **T2 -** Public Works agencies of the Louisville KY-IN MSA counties in partnership with KIPDA, Planning offices, community partners, etc.
- **T3** - LMG in partnership with Louisville KY-IN MSA counties and local bike shops, employers, universities, schools, houseless shelters, and more.

Milestones for obtaining implementing authority, as appropriate
None required

Implementation schedule and milestones
- **Months 1-4:** Program planning
- **Months 5-8:** Procurement and contracting
- **Months 8-60:** T1, T2, and T3

Geographic location or scope
- T1 - TARC service area
- T2 and T3 - Entire MSA

Funding sources (if relevant)
- Transit co-funding through LMG, Kentucky, Indiana, and U.S. Department of Transportation funds, as well as employers
- Co-funding through existing Complete Streets or similar public works programs

Metrics for tracking progress

- Miles of transit added
- Miles of Complete Streets added
- Number of bikes and e-bikes distributed and LIDAC distribution of participants
- Change in transit ridership
- Estimated reductions in car miles traveled and associated GHG reductions
- Co-pollutant changes as a result of modal shift
- Frequency and availability of public transport
- Availability and use of bikes and e-bikes
- % and demographic breakdown of population using public transport
- % and demographic breakdown of population using active travel options

LIDAC benefits

Snapshot:
- Reduced air pollution from lower vehicle miles traveled
- Reduced co-pollutants in LIDAC areas
- Reduced traffic congestion in LIDAC areas
- Improved and fast transportation access to employers, education, entertainment, sports facilities, cultural resources

Interviews with LIDAC stakeholders identified transportation needs as very high across the Louisville KY-IN MSA, and so expanded services and improved knowledge of those services can ensure reach to all residents, especially those who experience significant barriers to accessing jobs, education, food, and other services due to existing mobility challenges.

With the expansion, frequency, and reliability of service, LIDAC communities will be able to address existing transportation needs. Existing need for improved public transit is widely recognized in LIDAC communities, and TARC ridership is already critical amongst individuals within LIDAC areas, so work in this area will do less to shift behavior within LIDAC communities in the urban core, and, instead, ensure that shifts in availability and services are known and utilized. Expanded access to public transit in more rural areas of the Louisville KY-IN MSA will benefit from extensive marketing and a basis in meeting localized needs. For urban LIDAC tracts, their location along major highways and heavily used surface streets in the developed core comprising Louisville, New Albany, and Jeffersonville will mean that reductions in transportation-based emissions will in the short-term also bring cleaner air to communities facing higher environmental and health burdens. Reducing fossil fuel emissions along major roads and highways will mean reductions in diesel particulate matter and lower risks to LIDAC communities in Louisville's west and south, where rates of asthma are often higher.

Expansions in public transit options and availability, along with reduced fare options to economically vulnerable populations , will also improve short-term quality of life and mobility for LIDAC communities. As Figure 28 demonstrates, a significant number of households in LIDAC communities in the urban core do not have access to personal vehicles, often nearing or exceeding 20% of households. Expansions in public transit access and frequency will allow improved access to job opportunities, educational and training sites located across the city's core, and access to food, health care, social services, and other basic needs.

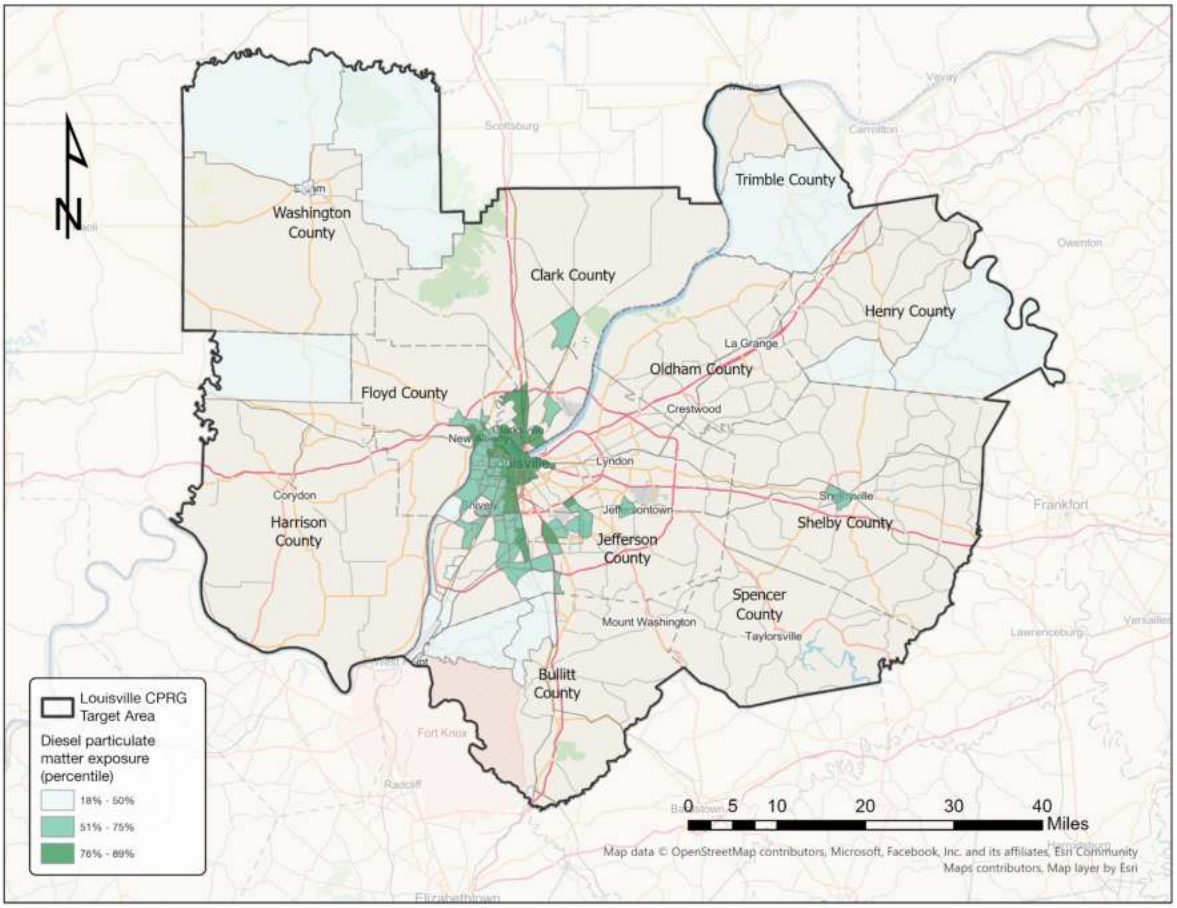
The expansion of public transit into rural areas of the Louisville KY-IN MSA, especially where no or little public transit currently exists, will meet significant needs for transportation access as well. As identified in LIDAC stakeholder interviews, extreme limitations in access to personal vehicles and public transportation in rural areas of the Louisville KY-IN MSA means very limited access to education, health care, social services, and jobs for many residents. As interviewees highlighted, these basic needs are strongly connected in everyday life, so access to improved transportation can mean significant gains in access to jobs and for meeting basic needs. This need will be examined as part of the CCAP.

Expansion of public transportation can also address traffic congestion, which disproportionately impacts LIDAC areas in the urban core of the Louisville KY-IN MSA (Figure 27). Alleviating traffic congestion can reduce localized emissions, reduce environmental noise, and improve street safety, providing short-term benefits to residents.

Expanded access to safe walking and biking routes across the Louisville KY-IN MSA, affordable access to bikes and e-bikes, and connections between public transit and safe active travel routes will help meet transportation needs within LIDAC communities. In conjunction with existing initiatives for expanding green space and safe access to active travel corridors (e.g. Rails to Trails in Indiana, Louisville Loop, etc), OS will work with partners to implement region-wide pathways across the Louisville KY-IN MSA for mobility and recreation.

Freight transportation: The transportation and warehousing industry is the third largest and the fastest growing industry[26] in Louisville, as evident by the city being home to UPS's headquarters among other logistics companies. According to research provided by the Environmental Defense Fund, there are more than 69 million square feet of leased warehouse space in the Louisville KY-IN MSA, and 37% of this expansion has been over the past 10 years. 158,000 people live within half a mile of leased warehouses, of which about a third are children under the age of 5. Low income, Black, and Hispanic/Latino/a/x residents are over-represented around warehouses. In the Louisville metro region in 2019, there were more than 900 new pediatric asthma cases attributable to nitrogen dioxide (NO2) pollution and more than 100 deaths attributable to PM2.5 pollution. Across the country, heavy duty vehicles compose around 10% of the vehicles on roads but are responsible for nearly half of the transportation sector's on-road nitrogen oxide (NOx) emissions and nearly 60% of fine particulate matter (PM2.5). These pollutants are a leading cause of disease in communities across the country, including childhood asthma, chronic obstructive pulmonary disease, and stroke.

While freight and logistics transportation was extensively discussed during our community engagement process, more targeted solutions in partnership with the logistics sector will be explored in the CCAP.



26 Office of Economic Development, "Growing Louisville Together, 2023," Louisville Metro Government.
https://louisvilleky.gov/economic-development/document/growing-louisville-together-final-12-22-2023

Figure 26: Diesel particulate matter exposure categorized by national percentile rank.

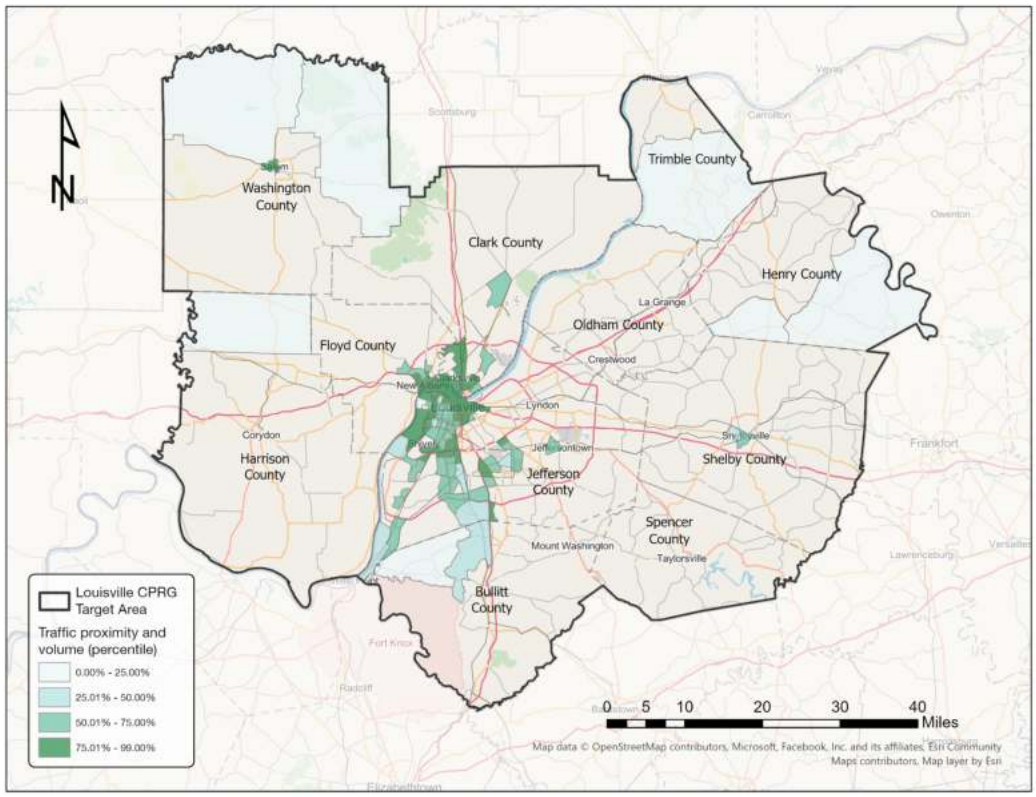


Figure 27: Traffic proximity and volume categorized by national percentile rank.

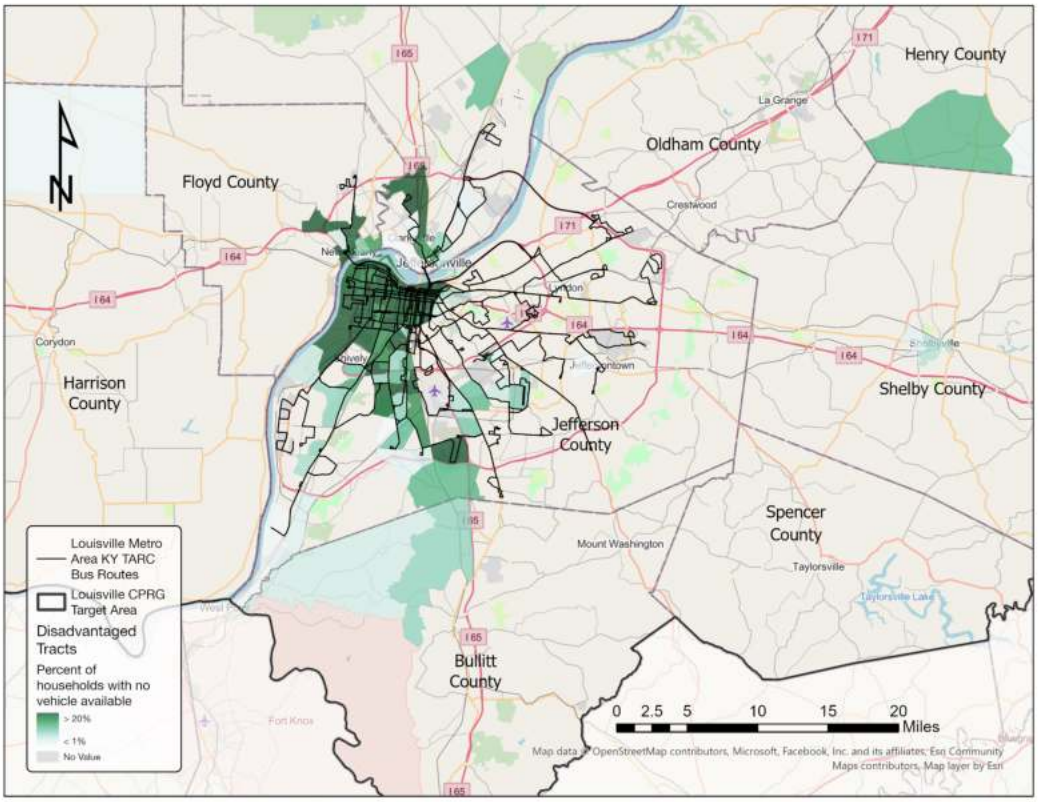


Figure 28: Transportation map featuring existing Transit Authority of River City (TARC) bus routes alongside the percentage of households without access to a vehicle in the Louisville Metro area.

3.5 Measure 5: WASTE AND WASTEWATER UPGRADES

Waste and Wastewater Sector Emissions (Baseline):

- 3% of Louisville KY-IN MSA Emissions
- 1,040,624 metric tons of CO2e

Satellite data suggests that the 2016 GHG inventory may have understated methane emissions. A review of methane emissions will be undertaken in development of the CCAP.

Description:
To meaningfully achieve critical GHG reductions in waste and wastewater sectors, we propose a collection of impactful actions that include investments in waste and wastewater infrastructure, as well as innovative programs that drastically reduce waste and enhance quality of life.

Actions:

Action W1: Reducing methane emissions from waste and wastewater facilities: Improved landfill and wastewater facility management would include detailed monitoring of methane emissions from landfills and other waste facilities using satellites and sensor systems; use of soil and other coverings to reduce landfill methane leaks; enhanced methane capture and usage; and more. Enhanced wastewater collection, treatment facilities, and operations would include reduction of methane and carbon dioxide releases (1) at waste treatment facilities through screening, dewatering, thermal hydrolysis, and anaerobic digestion, (2) source control through reduction in inflow and infiltration, (3) energy efficiency measures including power factor correction strategies, (4) energy reduction measures including solar, electric vehicle (EV) fleet, and related infrastructure, and (5) odor reduction strategies for LIDAC.

Action W2: Food waste diversion: Work with supermarkets and other food outlets to divert good quality food away from landfills and for utilization in food desert areas and LIDAC communities, in partnership with community organizations. Pair with a community-wide education program about behavior change strategies to reduce food waste and increase healthy food access.

Estimated quantifiable GHG emissions reduction

- 2025-2030: 208,000 MT CO2e
- 2030 – 2050: 1,040,000 MT CO2e

Note: Estimated GHG reductions include projections based on project proposals received from potential co-delivery/co-financing partners. At this time, no firm agreements are in place.

Implementing agency or agencies

- **W1 -** Landfills and sewer districts

- **W2** - LMG in partnership with Louisville KY-IN MSA counties, community based organizations, supermarkets, food and beverage businesses, wholesalers, employers, schools, universities, hospitals, houseless shelters, and others.

Milestones for obtaining implementing authority, as appropriate
None required for W2. For W1, implementing agencies will need to comply with all planning and regulatory issues relating to location restrictions on any methane capture or anaerobic digestion facilities.

Implementation schedule and milestones
- **Months 1-4:** Program planning
- **Months 5-8:** Procurement and contracting
- **Months 9-60:** W1 implementation
- **Months 8-60:** W2 implementation

Geographic location or scope
- Entire Louisville KY-IN MSA

Funding sources (if relevant)
- Co-funding through MSD, landfills, and other implementation partners
- Co-funding through food and beverage business partners, local and philanthropic funding

Metrics for tracking progress
- Quantity of methane emissions reduced
- Quantity of food diverted
- Number of healthy meals delivered
- Number and demographics of food recovery recipients
- Emissions avoided as a result of landfill diversion

LIDAC benefits
Snapshot:
- Reduced odors and methane emissions in LIDACs
- Improved healthy food access
- Reduced food costs
- Improved health outcomes from food security
- Potential jobs and business opportunities

4. Next Steps

For the next CCAP phase, the project team will work towards a more thorough GHG inventory, quantified GHG reduction measures, benefits analysis, and other components required by EPA. Further, the project team will continue community engagement, especially LIDAC engagement, utilizing the approach outlined below.

Process for LIDAC engagement for CCAP

The proposal for public engagement during the upcoming creation of the CCAP builds from a robust set of data collected during the creation of the PCAP between December 2023 and February 2024. Collected data includes: 1048 resident survey responses, 43 interviews with key LIDAC community stakeholders, three public meetings, and four meetings of the 80-member NZAG.

The existing data represented in the PCAP stands as a contextual foundation to which further ongoing interviews, feedback, and direct forms of connectivity with the LIDAC communities will inform the greater CCAP. Representatives of or from LIDAC tracts were offered compensation for their expert feedback included in this PCAP. Lessons learned from HUD Sustainable Regional Planning Grants suggest that commitment to funding community-based organizations' and local agencies' participation in the on-going development and implementation of the regional CCAP projects across the Louisville KY-IN MSA, is essential to ensuring future success. This will also serve to ensure that benefits to LIDAC tracts are considered throughout the life of the CCAP process and implementation of resulting programs.

Pre-engagement interviews with LIDAC key stakeholders established initial connections with identified communities, critical areas of need in our Louisville KY-IN MSA low-income and disadvantaged communities, and potential barriers and opportunities for further engagement. The following barriers were identified from stakeholder interviews and will inform further engagement with LIDAC communities:

- **Address logistical barriers for individual participation**: The time, frequency, and location of public meetings all affect civic engagement. Public meetings should occur in multiple locations across the Louisville KY-IN MSA and within the county or community of interest, and be led by a trained facilitator from that county to encourage participation. Provisions of childcare, food, transportation, and possible compensation for disadvantaged participants are crucial for representative engagement. Public engagement must be multimodal, offering virtual and in-person points of contact for meetings, and paper or online form versions to include participants of all-age.

- **Recognize the context of outreach in historically underserved communities**: Communities of color within the Louisville city area, and low-income communities within the urban and rural areas of the Louisville KY-IN MSA expressed mistrust of local government as a result of redlining, racism, structural inequities, and prior experiences. To build trust and believability, LMG must acknowledge historical power dynamics between the LIDAC communities and build relationships across the Louisville KY-IN MSA to create more authentic partnerships in marginalized areas. Attention to the racialized make-up of participatory groups is necessary, as well as considering the use of specific terminology to encourage engagement, for example

focusing on extreme weather, emergency planning, and resilience. Community stakeholders have challenged LMG to come to disadvantaged communities with "open ears" to hear and then respond to local needs.

- **Tailor community engagement and planning**: CCAP initiatives should be tailored to the expressed needs of specific low-income and disadvantaged counties and communities. Completed LIDAC stakeholder interviews found that community challenges, while overlapping, are unique to each location and population; for example, the similar challenges of food and transportation acquisition manifest differently across Southern Indiana, rural Kentucky, and the Louisville urban core due to geography and infrastructure. Respondents in Southern Indiana and rural LIDAC communities widely reported feeling disconnected from LMG and stakeholders in west and south Louisville reported concerns based on prior experiences of city engagement. CCAP processes should intend to reconcile these unique challenges with county-specific solutions, to eventually unite the Louisville KY-IN MSA region and improve regional connections.

- **Support existing community efforts:** Linkages with existing community initiatives should be made to uplift the expertise and organizing that is already occurring in communities within LIDAC tracts. Continued public engagement should occur through tabling at local events, fairs, community interest meetings, conferences, and organizations to reach LIDAC residents and collect direct feedback. Inviting local partners to planning groups and establishing clear partnerships with existing organizations will increase trustability, acknowledge local expertise, and prevent from creating additional work for LIDAC community members.

- **Increase participatory accessibility**: Public engagement documentation should be clear, concise, produced at a middle-school reading-level, and stored in an open-access database. Public meetings should include ASL and linguistic translation services. It is advised that local partners and trained facilitators lead community interest meetings as opposed to being sponsored or led by LMG, as this may deter participation.

These priorities and strategies are acknowledged and appreciated by the project team; however; their implementation thus far was limited due to a delay in receiving the grant and the short PCAP timeline. LMG is committed to better inclusivity and continuous improvement through the remainder of the CPRG process and beyond to create a stronger, healthier, and more sustainable future for our region.

PCAP public feedback: Upon publishing the PCAP draft, OS offered a one-week public comment period and received 18 responses from our public feedback form. Overall, community members were pleased with the PCAP measures but three comments highlighted the need to recognize stronger connections between climate justice and food justice. Community members rightly emphasized the importance of investing in projects that benefit both urban and rural communities; bridging the gap between climate action and food systems; and further mitigating greenhouse gas emissions. OS recognizes the critical importance of food justice and its connection to climate justice, and takes this feedback seriously. However, when calculating GHG reductions for the development of the PCAP, the GHG reduction impacts were not comparable to the GHG reduction estimated for other PCAP measures. Hence, it was determined that it may be more appropriate to integrate food justice initiatives into the CCAP process as well as other critical efforts outside of CPRG.