



LEHIGH VALLEY PRIORITY CLIMATE ACTION PLAN

Transportation Decarbonization

February 2024



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More detailed information about the LIDAC census tracts are found separately, on our website: www.lvpc.org.



Executive Summary

Climate change is often referred to on a global level because it is a threat to the health of our planet, but it also poses a significant threat to our region, which is evident every day. The region is experiencing more extreme weather events, and with two major rivers and an extensive stream network, it is now even more vulnerable to flooding. At the same time, the beauty and high quality of life here makes it attractive to more people and businesses, making it one of Pennsylvania’s fastest growing regions. The dilemma is more people and businesses typically result in more carbon emissions.

This Priority Climate Action Plan (PCAP) is focused on a specific sector of regional importance and has been prepared by the Lehigh Valley Planning Commission (LVPC) in accordance with the US Environmental Protection Agency’s (EPA) Climate Pollution Reduction Grant (CPRG) program guidance. It includes a list of near-term, high priority strategies to mitigate the impacts of climate change, even as we grow, by reducing greenhouse gas (GHG) emissions from one of the Allentown-Bethlehem-Easton Metropolitan Statistical Area (MSA) top sources — the transportation sector. The MSA includes Lehigh, Northampton and Carbon counties in Pennsylvania and Warren County in New Jersey. Lehigh and Northampton counties are the geographic focus of the Lehigh Valley Planning Commission (LVPC) and the Lehigh Valley Transportation Study (LVTS), which is the designated regional Metropolitan Planning Organization (MPO) specifically for the Lehigh Valley.

The transportation sector was selected as the focus for this PCAP, as it was determined to be one of the largest sources of GHG emissions in the region. It is also the area where we can have the greatest impact because it gives us access to billions of dollars of state and federal decarbonization funding streams, many of them created through the Infrastructure Investment and Jobs Act and the Inflation Reduction Act.

The PCAP includes several required elements including a comprehensive GHG inventory, specific GHG reduction goals, or measures, and associated projections of GHG emission reductions, a low-income and disadvantaged communities benefit analysis and a review of the authority to implement the proposed goals.

The transportation sector was selected as the focus for this PCAP, as it was determined to be one of the largest sources of GHG emissions in the region.

At the heart of this PCAP are its proposed GHG reduction goals.
Organized under a series of themes, the goals, include:

Theme 1

Integration of Land Use Planning and Transportation

Implement *Walk/Roll/LV: Active Transportation Plan*.

Increase transit ridership.

Theme 2

Transition to Clean (Low-Carbon) or Zero-Emissions Fuels

Supporting deployment of alternative fuel vehicles (AFVs) of all types.

Increase alternative fueling infrastructure and stations.

Theme 3

Green Infrastructure

Reimagine and retrofit major transportation corridors with green infrastructure.

Theme 4

Transportation Systems Management and Operations

Plan and implement Intelligent Transportation Systems (ITS) technologies.

Potential GHG emission reductions resulting from the goals outlined in this plan are estimated at 321,000 metric tons of CO₂e annually by 2050, a reduction from 2021 transportation sector emissions by nearly 12%. These goals, coupled with improvements in clean fuel technologies and other climate sector emission reduction goals will benefit our communities, our environment and our economy. Considering that the Lehigh Valley's population is projected to grow by 14.4%, job growth by 19% and Vehicle Miles Traveled (VMT) by 23% during this time, the actual reduction in emissions is much more significant as this occurs even with continued regional population and job growth. Each of the six goals are equally important, due to their community, economic and social benefits beyond the emissions reductions.

These goals were selected for their direct impact on reducing emissions and their additional benefits to the communities. Analyzing these benefits can reveal broader improvements in areas such as air quality, public health and economic growth, making the case for decarbonization even stronger.

Potential GHG emission reductions resulting from the goals outlined in this plan are estimated at 321,000 metric tons of CO₂e annually by 2050, a reduction from 2021 transportation sector emissions by nearly 12%.

An essential aspect of this PCAP is the low-income and disadvantaged communities (LIDAC) benefits analysis. This analysis is reflected in each of the individual GHG goals and more broadly in the context of transportation emissions reductions across the region. The LVPC Equity Analysis has been included and referenced in this document along with Justice40 goals. Equitable access to clean transportation and the benefits of improved air quality are key considerations.

The PCAP also includes a review of the authority to implement each goal, ensuring legal and administrative feasibility.

With the completion of the PCAP, the LVPC will then develop a Comprehensive Climate Action Plan (CCAP), which covers all major emission sectors within the region. Following adoption of the CCAP, the LVPC will monitor progress on the plan goals, which is the third phase of the EPA CPRG program.

The commitment to transportation decarbonization, through this PCAP, reflects a forward-thinking approach to climate action, balancing environmental imperatives with social equity and economic viability.



Introduction

Climate Pollution Reduction Grant Overview

The 2022 Inflation Reduction Act authorized the United States Environmental Protection Agency (EPA) to allocate funding to states, local governments, tribes and territories under the Climate Pollution Reduction Grant (CPRG) program to develop and implement climate action plans to reduce greenhouse gas emissions and other harmful air pollutants. Many of the largest metropolitan areas in the US received funding from the CPRG program, including the Allentown-Bethlehem-Easton Metropolitan Statistical Area, for which the Lehigh Valley Planning Commission (LVPC) is the lead organization and official planning commission of Lehigh and Northampton counties. This planning grant provides \$1 million over a four-year period for the LVPC to use for climate action planning.

The CPRG program consists of three phases: Priority Climate Action Plan (PCAP), Comprehensive Climate Action Plan (CCAP) and Plan Progress and Monitoring. This plan is the deliverable for the PCAP, which is focused on an emissions sector of highest priority. With the completion of the PCAP, the LVPC will then develop a Comprehensive Climate Action Plan, which covers all major emission sectors within the region. Following adoption of the CCAP, the LVPC will monitor progress on the plan strategies, which is the third phase of the program. In addition to the planning grant funds allocated to the metropolitan areas, the CPRG program also offers approximately \$4.6 billion in competitive implementation grants. Completion of the PCAP opens access to apply for this larger pool of funding.

With the completion of the PCAP, the LVPC will then develop a Comprehensive Climate Action Plan, which covers all major emission sectors within the region.

Priority Climate Action Plan Overview

A Priority Climate Action Plan (PCAP) is a strategic and comprehensive approach designed to address climate change effectively within a specific community, organization or region.

The LVPC, recognizing the critical role of transportation in regional greenhouse gas emissions, has identified transportation decarbonization as the focus of its Priority Climate Action Plan. This strategic approach is designed to effectively address climate change, focusing on reducing emissions from one of the most significant emission sources: the transportation sector.



Central to the PCAP is a comprehensive greenhouse gas (GHG) inventory, which provides a detailed baseline of current emissions, with a particular emphasis on transportation sources, such as vehicles, public transit and freight. This inventory is crucial as it sets the stage for targeted interventions. GHG emission projections are also valuable, offering insights into potential future emission trends and the impacts of various decarbonization strategies.

At the heart of the PCAP are GHG reduction goals. These include strategies such as promoting the use of alternative fuel vehicles and enhancing cycling and pedestrian infrastructure. These goals are selected not only for their direct impact on reducing emissions but also for their additional benefits.

Analyzing these benefits can reveal broader improvements in areas such as air quality, public health and economic growth, making the case for decarbonization even stronger.

An essential aspect of the PCAP is the low-income and disadvantaged communities (LIDAC) benefits analysis. This analysis ensures that low-income and disadvantaged communities are not only protected from potential negative impacts of climate policies but also benefit from the policies. Equitable access to clean transportation and the benefits of improved air quality are key considerations.

The PCAP includes a review of the authority to implement each goal, ensuring legal and administrative feasibility. In addition, exploring the availability of other funding sources can provide a more robust and sustainable approach to implementing the plan. Finally, the region's next steps will include the development of a Comprehensive Climate Action Plan (CCAP) and a monitoring process to measure the success of the CCAP.

 **This analysis ensures that low-income and disadvantaged communities are not only protected from potential negative impacts of climate policies but also benefit from the policies.** 

Scope of the Priority Climate Action Plan

This PCAP is focused specifically on the transportation sector of the defined Allentown-Bethlehem-Easton Metropolitan Statistical Area (MSA). The MSA includes Lehigh, Northampton and Carbon counties in Pennsylvania and Warren County in New Jersey. Lehigh and Northampton counties are the geographic focus of the LVPC and the Lehigh Valley Transportation Study (LVTS), which is the designated regional Metropolitan Planning Organization (MPO) specifically for the Lehigh Valley. Carbon County is part of the Northeastern Pennsylvania Alliance (NEPA) MPO, while Warren County is part of the North Jersey Transportation Planning Authority (NJTPA). For this PCAP, the term “Lehigh Valley” refers to Lehigh and Northampton counties, while the term “region” refers to the broader MSA (including Carbon and Warren counties).

The focus of the PCAP on the transportation sector was determined through an evaluation of multiple factors. One is that transportation is a major source of greenhouse gas emissions in the Lehigh Valley. Two interstate highways, I-78 and I-476, run through the Lehigh Valley, along with other heavily traveled highways, such as Route 22, Route 33, Route 309, Route 378 and other appropriate major corridors, which account for a significant portion of the region’s vehicle travel and emissions. The LVPC’s comprehensive *Lehigh Valley Greenhouse Gas Assessment*, completed in 2022, found the transportation sector to be the second largest greenhouse gas source, as it was responsible for approximately 26% of all greenhouse gas emissions in the Lehigh Valley in 2019.

In addition, the Lehigh Valley is experiencing a period of great growth in both population and employment. From 2010 to 2020, the Lehigh Valley's population increased from 647,949 to 687,508, and by 2050, it is projected to increase by nearly 100,000 to 786,751, which is roughly equivalent to adding an additional City of Bethlehem and City of Easton to the Lehigh Valley. Employment opportunities are contributing to this rise, as job growth is forecast to increase by 19.1% by 2050. A large portion of this job growth is in the transportation and warehousing industries. From 2016 through 2023, more than 30 million square feet of warehouse and distribution space was approved in the Lehigh Valley. The movement of goods and the associated employment opportunities in these industries are factors in the rise in vehicle miles traveled (VMT) and current level of transportation greenhouse gas emissions in the Lehigh Valley. Overall, increases in population and economic activity generate more vehicle traffic. Vehicle miles traveled in the Lehigh Valley increased from 13,772,215 miles per day to 14,823,542 miles per day in 2019. In 2020, daily VMT dipped because of the COVID-19 pandemic, but it is now back to pre-pandemic levels and is forecast to increase by 23.2% by 2050. This increasing transportation demand necessitates proactive planning to ensure a sustainable future for the Lehigh Valley transportation network.

Carbon County is situated in northeastern Pennsylvania and encompasses a mix of rural and urbanized areas that offer its residents a combination of natural surroundings and access to amenities. Based on 2020 US Census data, Carbon County has a population of 64,749 people. Overall, Carbon County has experienced slow, stable population growth between 2010 and 2020, and this trend is likely to continue. Two interstate highways, I-80 and I-476, run through Carbon County along with US 209 and Route 248. The presence of I-80 in Carbon County supports freight transportation as it connects major areas to the Port of New York and New Jersey, which can increase freight movement and emissions in the county. And as a gateway to the Pocono Mountains, the county experiences significant tourism, resulting in increased travel and transportation emissions.

Warren County is primarily a rural county in New Jersey with several low- and mid-density towns and boroughs. According to the *Warren County Transportation Master Plan (2021)*, demographic projections developed for their Strategic Growth Plan (2004) anticipated the county's historic population growth rate of approximately 1% per year would continue through the year 2030. Land use and traffic forecasts based on this growth rate indicated there would be significant development, population and employment growth, resulting in increased

traffic congestion and mobility. Instead, Warren County experienced an unexpected slowing of their population growth in the mid-2000s, which was then followed by a decline in population, a trend which continued through 2020. The resulting growth rate from 2000-2020 was 0.22% per year. In contrast, employment growth in Warren County increased due to the high demand for freight and the presence of Interstates 78 and 80, which provide regional linkages for freight in the county. Overall, the increase in demand for freight and employment growth can cause an increase in congestion and transportation emissions in Warren County.

Targeting transportation as the priority focus area enables a wider variety of decarbonization funding opportunities. The PCAP creates avenues to receive funding from not only the CPRG program but also Carbon Reduction Plan (CRP) funds, Congestion Mitigation and Air Quality (CMAQ) funds, Transportation Alternatives Set-Aside (TASA) funds, Promoting Resilient Operations for Transformative, Efficient and Cost-Saving Transportation (PROTECT) formula funds,

and other federal and state transportation funding sources. Considering the current investments, it becomes apparent how important this time is for climate and transportation planning. The region has an opportunity to plan for and implement impactful strategies utilizing this Priority Climate Action Plan.

Climate change also poses specific challenges to transportation that may continue to worsen. Flooding events are anticipated to occur more frequently, which are hazardous to bridges, pavement and other elements of transportation infrastructure. Another threat is increasing temperature, which puts greater stress on road surfaces. According to the Federal Highway Administration (FHWA), more frequent freeze-thaw cycles weaken pavement, and extreme heat can cause substantial structural damage to roadways. Climate-related hazards can disrupt the region's transportation network by causing unsafe travel conditions and delays, transit service interruptions, costly infrastructure repairs and economic losses.

Climate action planning will not just reduce the negative effects from climate-related hazards but also provides many benefits to the region. Electric and alternative fuel vehicle adoption will not only reduce greenhouse gas emissions but reduce associated air pollutants, such as particulate matter, ozone and sulfur dioxide, resulting in cleaner and healthier air for all. Improving active transportation and transit accessibility will reduce private vehicle emissions, making it easier for people of all income levels and physical abilities to move around and live in their communities. Installing green infrastructure along road rights-of-way will sequester carbon, purify the air, reduce stormwater runoff volume and velocity, provide pollinator habitats, mitigate heat island effects and beautify the built environment. These are just a few examples of the many possible benefits to the region through the actions proposed in this plan.

Due to the increased usage of the region's transportation network, the growing threat of climate change to the communities, environment and infrastructure, the unprecedented funding opportunities for transportation decarbonization and the host of potential benefits possible to the region, it is clear that transportation decarbonization should be the focus for this PCAP.

This analysis ensures that low-income and disadvantaged communities are not only protected from potential negative impacts of climate policies but also benefit from the policies.

Approach to Developing the Priority Climate Action Plan

The LVPC has a long history of planning for and promoting the protection of the natural environment. The LVPC's sister organization, the Lehigh Valley Transportation Study (LVTS), for decades has focused on reducing transportation-related emissions, protecting endangered species, floodplains and other environmental assets, as a means for improving safety. Lehigh and Northampton counties, along with the LVPC and LVTS, took a leadership role in preparing for climate change in 2014 to develop the *Climate + Energy Element*. The *Climate + Energy Element* provides an overview of climate change and energy use and reports on the potential impacts on Pennsylvania's water resources, aquatic ecosystems, forests, agriculture, human health and economy. The policies and

actions in the *Climate + Energy Element* became the climate change foundation for *FutureLV: The Regional Plan*, Lehigh and Northampton counties' *Livable Landscapes Plans* and *Walk/Roll LV: Active Transportation Plan*.

Through these plans, the LVPC supports and reinforces the importance of environmental and climate resiliency throughout Lehigh and Northampton counties. Climate action is a continuous thread through the foundational plans of the LVPC, LVTS, and Lehigh and Northampton counties. The LVPC's approach to developing this PCAP builds from these foundational plans, which contain over 520 climate action policies.

Plans of Significance Referred To In The PCAP

2014



Climate + Energy Element

The LVPC's *Climate + Energy Element* provides an overview of climate change and energy use and reports on the potential impacts on Pennsylvania's water resources, aquatic ecosystems, forests, agriculture, human health and economy.

2016



Livable Landscapes: An Open Space Plan for Northampton County

Livable Landscapes: An Open Space Plan for Northampton County was developed as a guide for the conservation, restoration and enhancement of Northampton County's open space resources. The plan contains a framework that broadly builds climate action throughout its many goals, policies and actions.

2018



Livable Landscapes: A Park, Recreation, Open Space, Agricultural and Historic Lands Plan for Lehigh County

Livable Landscapes: A Park, Recreation, Open Space, Agricultural and Historic Lands Plan for Lehigh County was created to guide the conservation, restoration and enhancement of Lehigh County's open space and cultural resources and to create linkages between these resources.

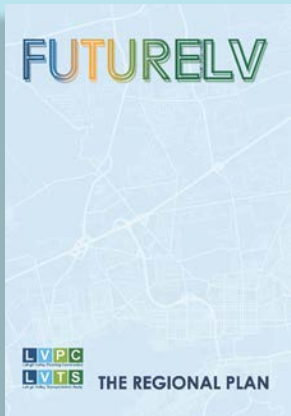
2020



Walk/Roll LV: Active Transportation Plan

Walk/Roll LV: Active Transportation Plan works in partnership within the broader structure of the Long-Range Transportation Plan in coordinating public transit, trail, sidewalk, bikeway and roadway systems to create a seamless regional transportation network that is safe and convenient.

2023



FutureLV: The Regional Plan

FutureLV: The Regional Plan combines the state-mandated regional comprehensive plan with the federally mandated Long-Range Transportation Plan (LRTP), setting the vision and direction to carry the Lehigh Valley to 2050. This plan provides a blueprint for managing future growth, making the most of the region’s assets, and promoting a region where everyone has access to health, opportunity and a livable neighborhood. It also represents the investment strategy for the region’s transportation infrastructure to meet current and future needs, manage transportation-related emissions, improve transportation infrastructure resiliency and create options for non-automobile trips.

Local Climate Plans + Programs

The Pennsylvania Department of Environmental Protection's Local Climate Action Program (LCAP) provides technical assistance to local governments that wish to reduce greenhouse gas emissions and address climate change. Assistance is provided for the preparation of greenhouse gas inventories and local climate action plans.

Within the Lehigh Valley, several municipalities have entered the program, including the cities of Allentown and Easton and the townships of Lower Macungie and Palmer. Easton completed a greenhouse gas inventory and prepared a municipal climate action plan in 2021. Allentown and Lower Macungie have completed greenhouse gas inventories, with the next step to prepare climate action plans. Palmer Township recently entered the program. In addition to the

municipalities involved in the LCAP, the City of Bethlehem completed its own greenhouse gas inventory and climate action plan in 2021. Colleges and universities in the Lehigh Valley have also entered the program, providing college students the opportunity to collaborate with local governments to develop a greenhouse gas inventory and climate action plan. These colleges and universities included Muhlenberg College, which entered the program in 2020 and Moravian University, which entered the program in 2021. Municipal climate action planning efforts build upon and complement this Priority Climate Action Plan through specific mitigation and resiliency strategies and implementation plans for their communities.

State Climate Plans + Programs

Development of this Priority Climate Action Plan aligns with and incorporates related plans from state agencies. The Pennsylvania Department of Transportation's (PennDOT) Carbon Reduction Strategy aims to provide funding for projects that reduce transportation emissions, along with project identification, policy guidance and funding information. Development of the strategy was done in coordination with Pennsylvania MPO's, including the Lehigh Valley Transportation Study and Northeastern Pennsylvania Alliance.

The 2021 *Pennsylvania Climate Action Plan* serves as a guide for policy development, priority setting and actions to be taken to meet Pennsylvania's greenhouse gas reduction goals and adapt to climate change. This plan covers all emissions sectors, including transportation. Four transportation-specific greenhouse gas reduction strategies are stated in the plan:

- ▶ Increase fuel efficiency of all light-duty vehicles and reduce vehicle miles traveled for single-occupancy vehicles.
- ▶ Implement the multi-state medium- and heavy-duty zero-emission vehicle memorandum of understanding, of which the Commonwealth is a signatory.
- ▶ Increase adoption of light-duty electric vehicles (EV).
- ▶ Implement a low-carbon fuels standard.

Increasing vehicle efficiency, reducing vehicle miles traveled and EV adoption are all important aspects of this PCAP, which is fortified by regional and state coordination.

According to the *Pennsylvania Climate Impacts Assessment 2021*, climate change poses a growing threat to nearly every aspect of life in the Commonwealth, and the impacts are expected to increase in severity unless actions are taken. While global average temperature is expected to rise at least 1.5°C (2.7°F) in the coming two decades, warming in Pennsylvania and the Lehigh Valley is expected to increase by 5.9°F by 2050, according to the Pennsylvania Assessment. These changes in our climate will have widespread impacts across the Lehigh Valley and the region.

To quantify the Commonwealth's greenhouse gas emissions in 2019, the Pennsylvania Department of Environmental Protection (PA DEP) created the 2022 *Pennsylvania Greenhouse Gas Inventory Report*. In the report, emission sources were split into sectors. These sectors, from largest to smallest, are industrial, electricity production, transportation, residential, commercial, agriculture and waste management. From the report, the Lehigh Valley accounted for 3.7% of Pennsylvania's greenhouse gas (GHG) emissions. This comparison with state-level data provides a perspective on the region's relative contribution to statewide environmental impacts.

The PA DEP report, along with the greenhouse gas inventory update for the Lehigh Valley described in Section 2 of this PCAP, provides a clear understanding of greenhouse gas emission sources so that planning efforts can be coordinated to improve local environmental conditions.

Public Engagement

The LVPC established public working groups in 2018 after an extensive Equity and Access to Opportunity Analysis, supporting the update of *FutureLV: The Regional Plan*. The resulting WorkshopLV groups are subject area, open task forces on a variety of issues from the environment to freight and housing to multimodal transportation. Any person participating becomes a decision-maker, resulting in an inclusionary process. As a result, WorkshopLV meetings and outreach provided better access to equity and environmental justice communities in the Lehigh Valley.

Throughout the development of this Priority Climate Action Plan, LVPC staff have utilized the WorkshopLV format to receive input and feedback from residents and stakeholders of the Lehigh Valley to gauge the priorities of the region in terms of reducing transportation emissions. These workshops have provided a forum to share PCAP information and receive input and ideas directly from participants. Invitations to the workshops were sent to municipal officials, municipal environmental advisory councils, LVPC and LVTS members, active transportation advocacy groups, Greater Lehigh Valley Chamber of Commerce, non-profit groups, church groups, colleges/universities, commercial and industrial real estate interests, freight industry groups, freight operators, water and sewer authorities, manufacturers and citizens, among many others. The workshops were also promoted on the LVPC website, as well as on our social media platforms.

Three virtual sessions of the LVPC's first workshop were held in September 2023, where participants were introduced to the CPRG program and the PCAP and provided opportunities for input on the PCAP direction. During the virtual presentations, attendees participated in an online poll exercise to indicate their priority policy areas. To create more meaningful participant engagement, an in-person workshop was conducted in October 2023. This workshop provided additional background on the CPRG program as well as existing LVPC plans and initiatives that support this work. An interactive activity was conducted where participants were asked to indicate the existing LVPC transportation goals and policies that were important to them now and those that would be important in the future. This activity helped build a deeper understanding of priorities and fostered a lengthy, constructive dialogue for the rest of the meeting. In November 2023, the LVPC hosted another workshop in collaboration with members of the Lehigh and Northampton Transportation Authority (LANTA), who presented their Enhanced Bus Service Study and their planned Bus Rapid Transit progression, demonstrating the important role transit has in decarbonizing the Lehigh Valley's transportation sector. This again created a constructive, engaging conversation with participants.

The LVPC hosted its third in-person WorkshopLV in December 2023 to review PCAP policies and strategies and receive additional input. In January 2024, the LVPC hosted an in-person WorkshopLV meeting to present a draft of the emission reduction goals required for this plan and to receive additional feedback from workshop participants on their thoughts or suggestions for these goals. An additional workshop was held in February 2024 to share the final PCAP document with participants.

Throughout the public engagement process, the LVPC received impactful feedback from workshop participants who provided ideas to help in the selection of climate reduction goals included in this PCAP. Some issues and concerns raised by workshop participants included:

- ▶ Creating greater bicycle network connectivity, infrastructure and parking.
- ▶ Widening and shading sidewalks.
- ▶ Enhancing multimodal access to green spaces.
- ▶ Planning for future forces such as e-bikes and alternative fueled vehicles.
- ▶ Connecting corridors and population centers with transit and active transportation.
- ▶ Providing accessibility to electric vehicles for low-income and disadvantaged communities.
- ▶ Developing strategies to increase transit ridership.

WorkshopLV attendees and interactive activity results can be found in Appendix A.

In addition to the WorkshopLV outreach described above, virtual public meetings of the LVPC and LVTS committees were held monthly beginning in September 2023 that included presentations on the CPRG program and PCAP as well as draft policies and strategies.

The LVPC also organizes and manages the biannual meetings of the Lehigh Valley General Assembly, which includes all 62 local governments, 17 school districts, Lehigh and Northampton counties, state and federal elected representatives and senators and is designed to coordinate and collaborate across political boundaries. An overview of the CPRG program and PCAP were presented at the General Assembly virtual meeting held in November 2023, which was also open to the public.

All work of the CPRG effort will be housed online as part of the LVPC website and include a comprehensive data repository, with online mapping and monitoring components.



163 People
from across the Lehigh Valley
attended the workshops



Priority Climate Action Plan Elements

Lehigh Valley Greenhouse Gas Inventory

The LVPC prepared the *Lehigh Valley Greenhouse Gas Assessment* in 2022. The assessment's geographic focus was on the Lehigh Valley, accounting for all major sources of greenhouse gas (GHG) emissions. The inventory, which utilized 2019 as its baseline year, includes emissions generated within the boundaries of Lehigh and Northampton counties and those resulting from electricity used within this area, regardless of where the electricity is generated.

This comprehensive inventory described emissions data across the following key sectors, each contributing significantly to the overall environmental footprint of the Lehigh Valley:

Industrial Electricity and Natural Gas

GHG emissions from a wide range of industrial activities and their energy usage patterns.

Commercial Energy

GHG emissions arising from energy utilized in commercial buildings and services. This involves understanding the energy demands of the commercial sector, including offices, retail spaces and other service-oriented establishments.

Transportation and Mobile Sources

GHG emissions from various forms of transportation, including cars, trucks, public transit and other mobile sources.

Solid Waste

The management of solid waste and its associated emissions, particularly landfill gas emissions.

Residential Energy

GHG emissions derived from household energy use, including residential energy consumption patterns, providing insights into possible areas for emission reduction in domestic settings.

Water and Wastewater

GHG emissions related to water treatment processes and wastewater management. This includes emissions from water treatment plants and the processing of wastewater, both of which are essential components of the Lehigh Valley's infrastructure emissions.

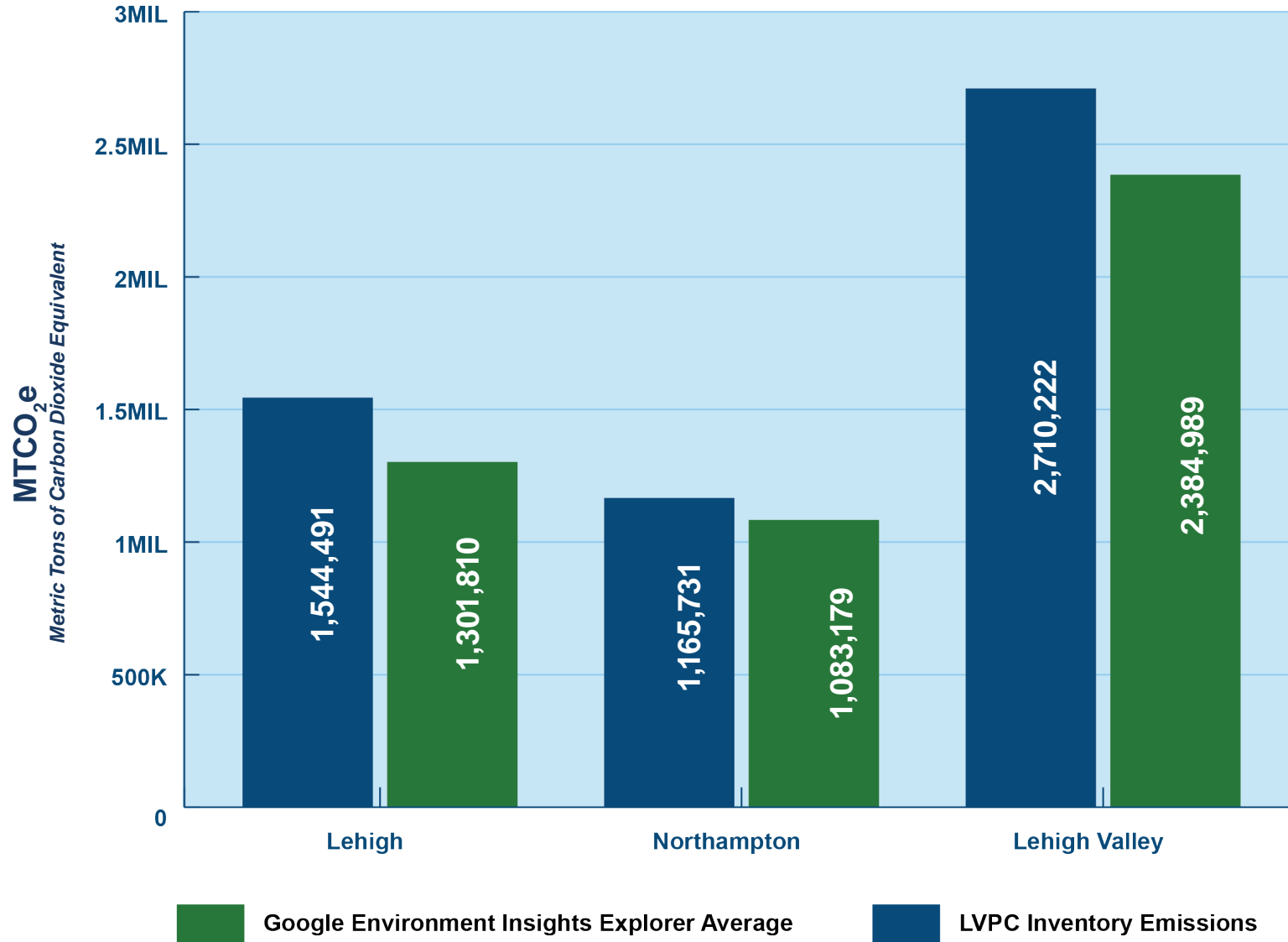
Since the focus of this PCAP is on transportation, only the Transportation and Mobile Sources sector emission estimates were updated from the 2022 report. The base year for the updated estimate is 2021 and includes business-as-usual forecasts through 2050.

For the greenhouse gas inventory update, transportation emission estimates for the Lehigh Valley were calculated using the US Environmental Protection Agency's (EPA) MOVES 3.1 program. The program's assumptions and emission constants are supported by PennDOT, which utilizes the MOVES program to calculate the Lehigh Valley's transportation air quality performance metrics. Three greenhouse gases are included in the inventory: carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). This inventory represents emissions in "carbon dioxide equivalent" (CO₂e) values. A carbon dioxide equivalent is a measure that converts the concentration or amounts of other gases within the atmosphere to the equivalent amount of carbon dioxide with the same global warming potential.

The data review process was a critical component of the greenhouse gas inventory update, ensuring the accuracy and relevance of the information to the local context of Lehigh and Northampton counties. This included comparing different data sets to ensure consistency and reliability. For instance, the updated transportation emissions data calculated from the EPA's MOVES 3.1 program was cross verified with data from Google Environmental Insights Explorer (EIE), which compiles user data from various apps like Google Maps. Such comparisons allow for a more nuanced understanding of emissions, considering factors like vehicle miles traveled broken down by vehicle types based on fuel use.

A carbon dioxide equivalent is a measure that converts the concentration or amounts of other gases within the atmosphere to the equivalent amount of carbon dioxide with the same global warming potential.

Transportation Greenhouse Gas Emissions

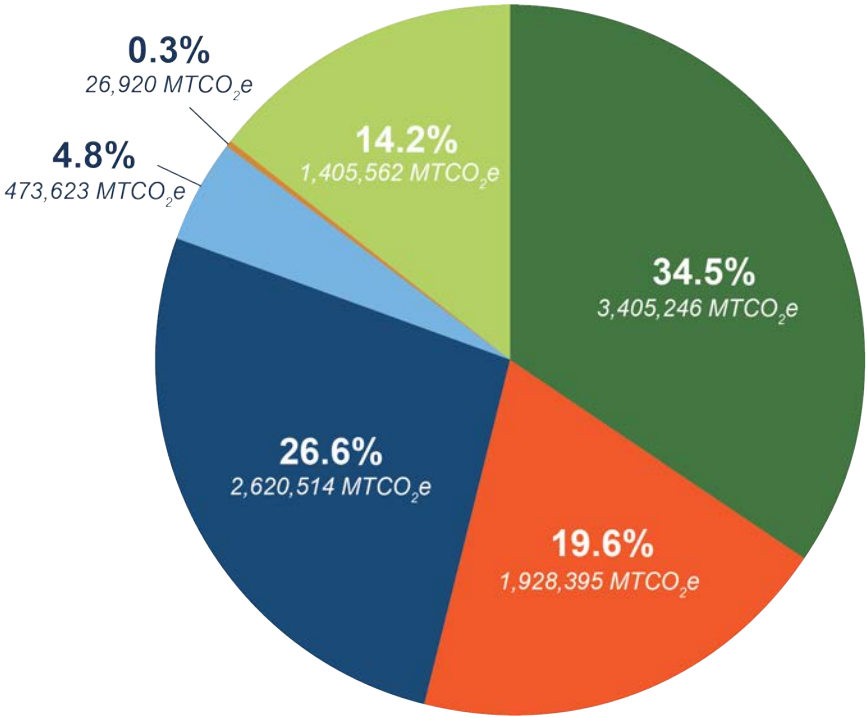


While the Industrial Electricity and Natural Gas sector emerged as the largest contributor to the Lehigh Valley's emissions in 2019, accounting for a substantial 34.5%, the Transportation and Mobile Sources sector followed closely behind at 26.6%.

With the greenhouse gas update completed as part of this PCAP, transportation emissions in the Lehigh Valley increased slightly from 2019 to 2021, which can be attributed to population and economic growth, along with a rebound from the dip in transportation activity during the beginning of the COVID-19 pandemic.

Most vehicles on Lehigh Valley roads are passenger vehicles, such as cars

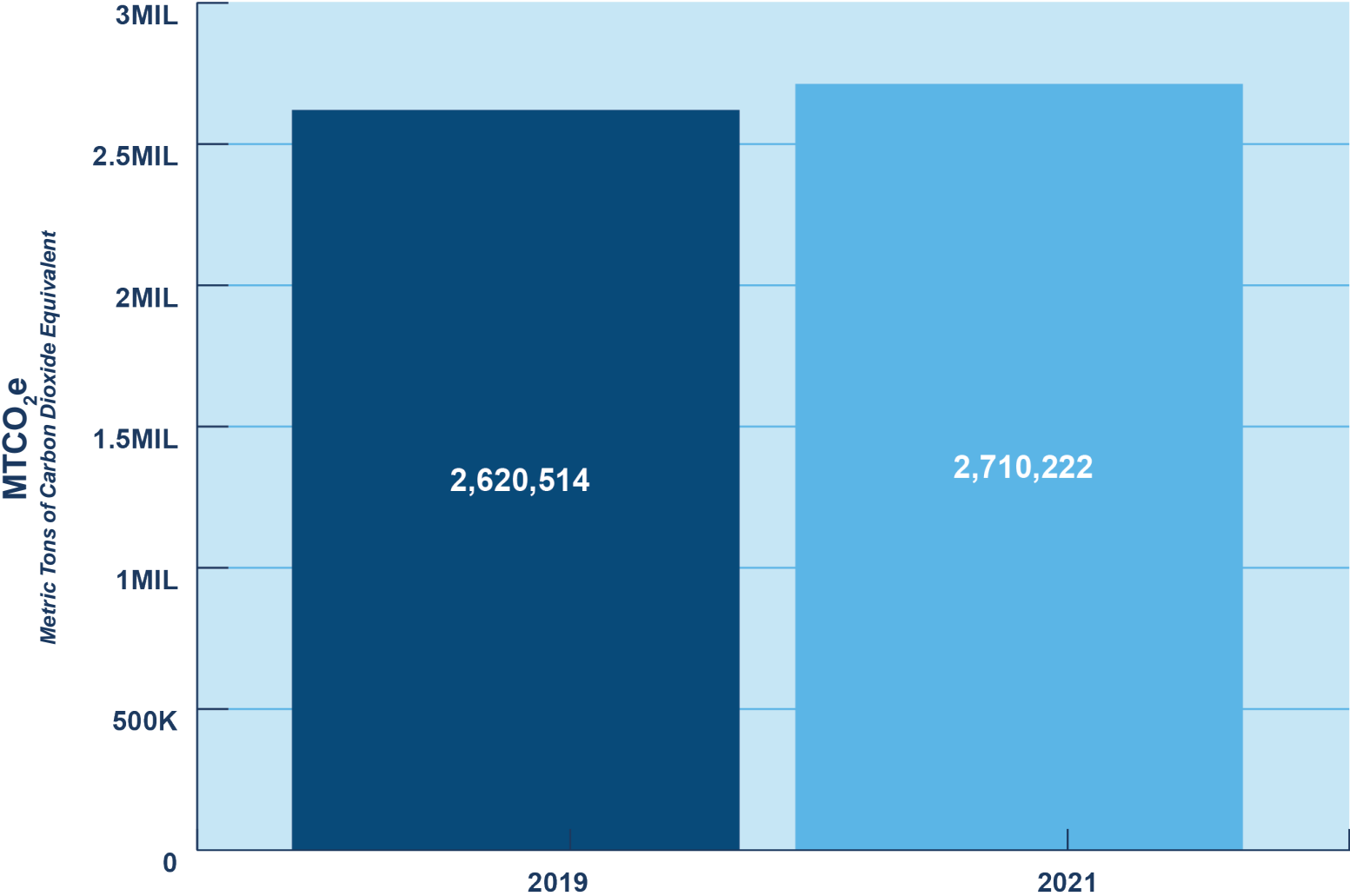
2019 Greenhouse Gas Emissions by Sector



MTCO₂e
Metric Tons of Carbon Dioxide Equivalent

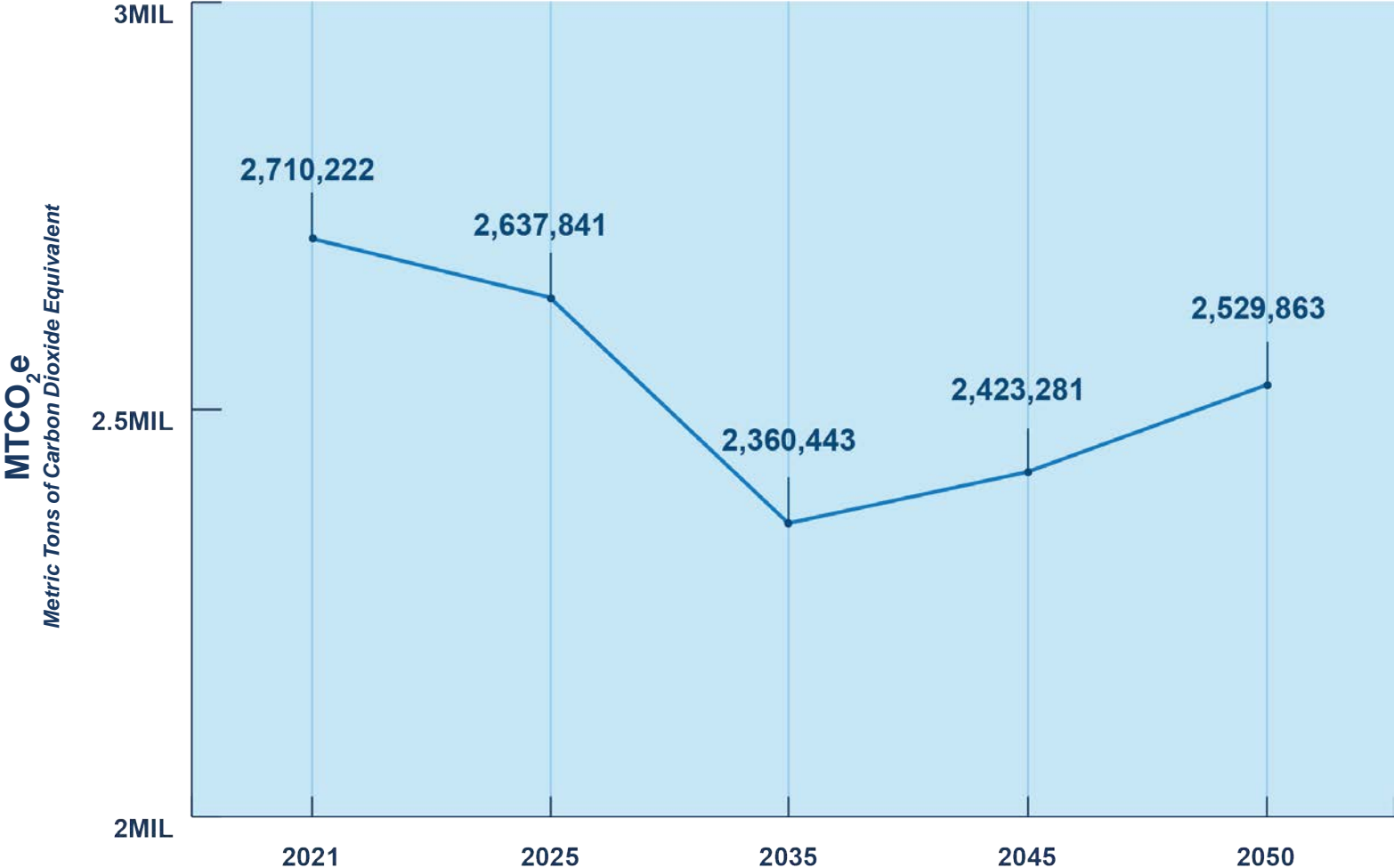


Total Transportation Sector Greenhouse Gas Emissions



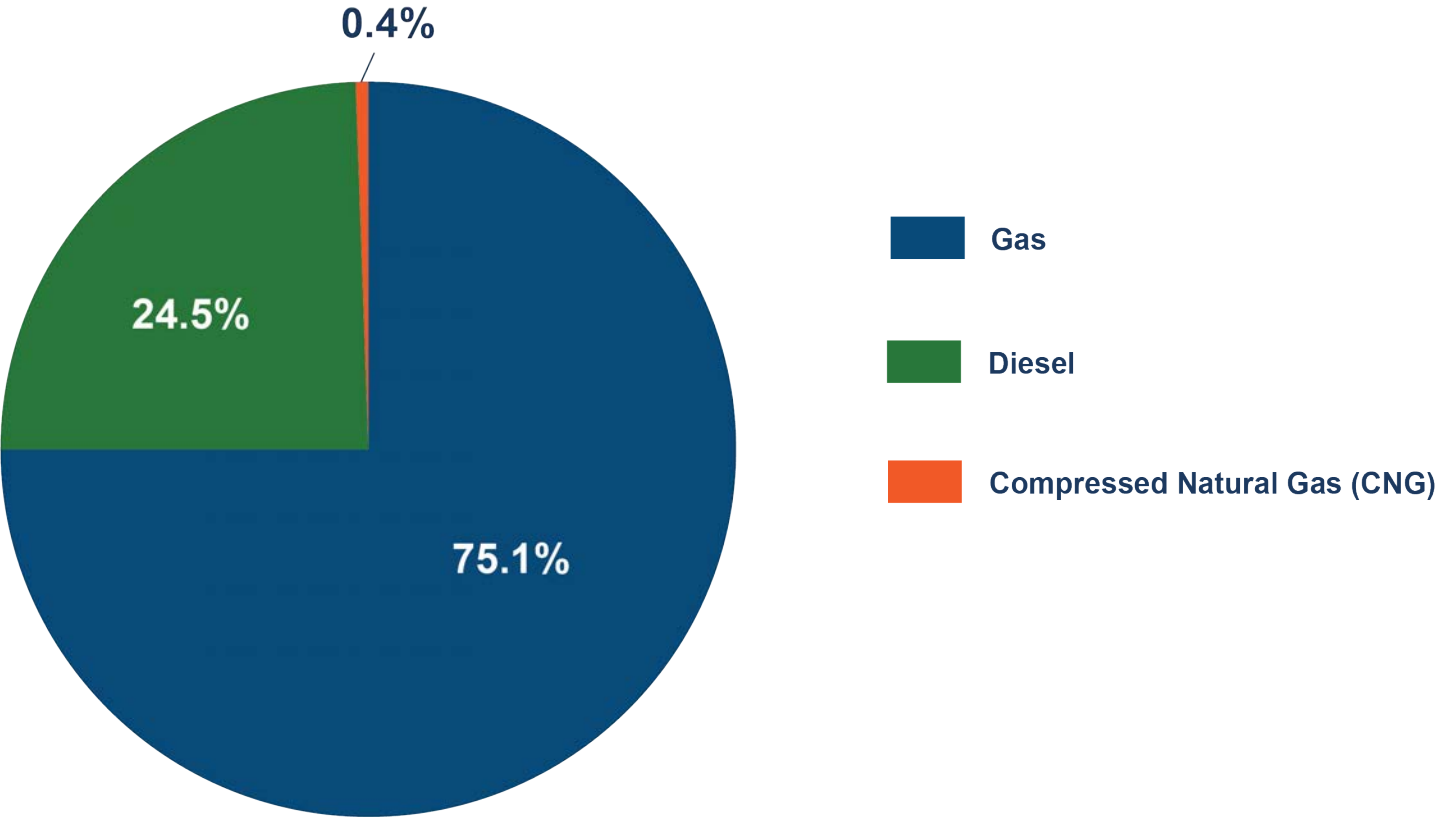
Due to increasing fuel efficiencies and adoption of alternative fuel vehicles, transportation emissions are forecast to drop in the near term. However, emissions are projected to begin increasing again near mid-century, as an increasing number of vehicles on the roads and vehicle miles traveled outweigh efficiency increases.

Total Estimated Greenhouse Gas Emissions *Transportation Sector* 2021-2050



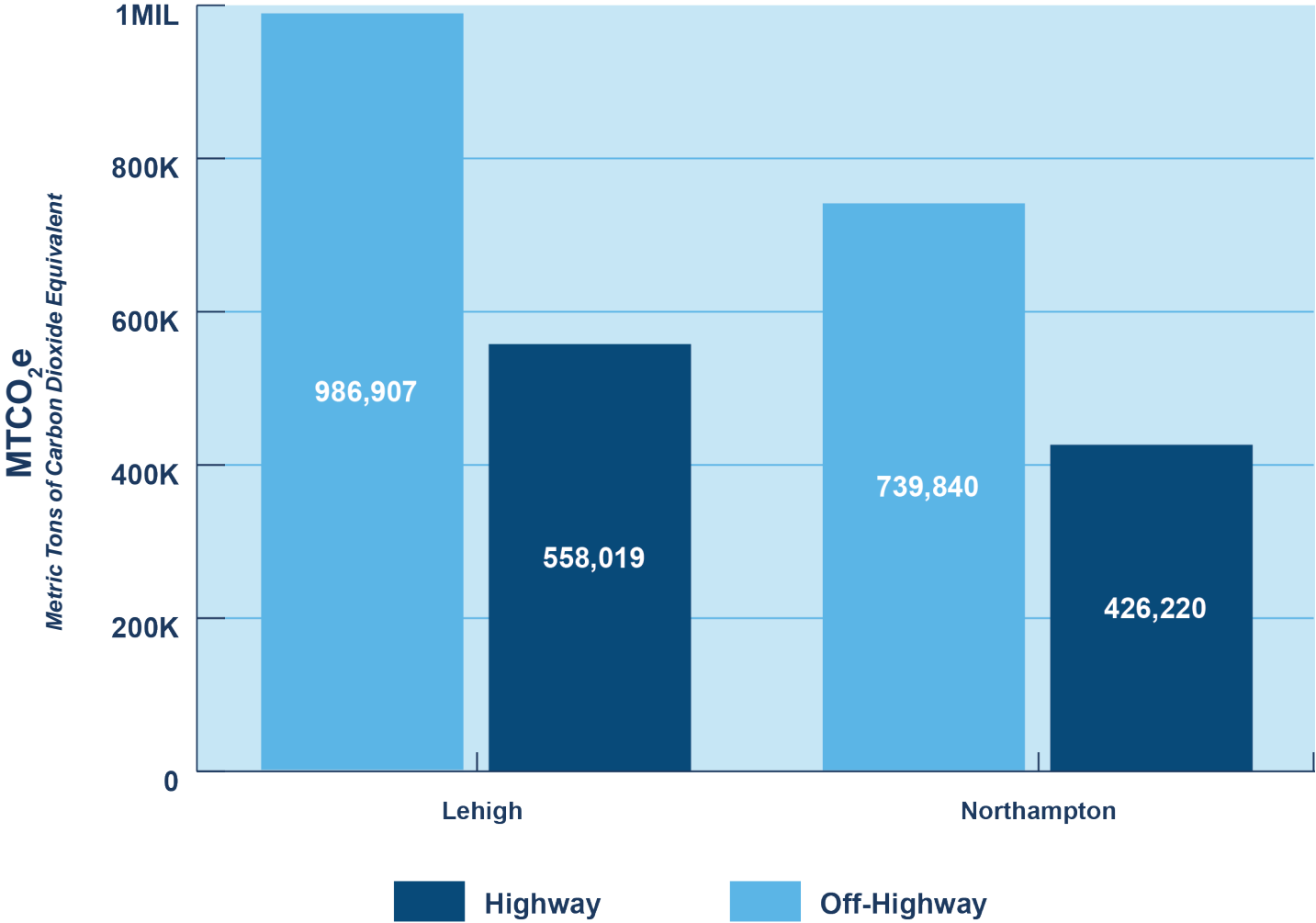
Over three-fourths of transportation emissions are from gasoline combustion, mostly from personal passenger vehicles. The remaining quarter is mostly diesel combustion emissions, such as from tractor-trailers and trucks, and compressed natural gas used primarily in the Lehigh and Northampton Transportation Authority (LANTA) bus fleet, which represents a very small portion of overall emissions.

Greenhouse Gas Emissions by Fuel Type



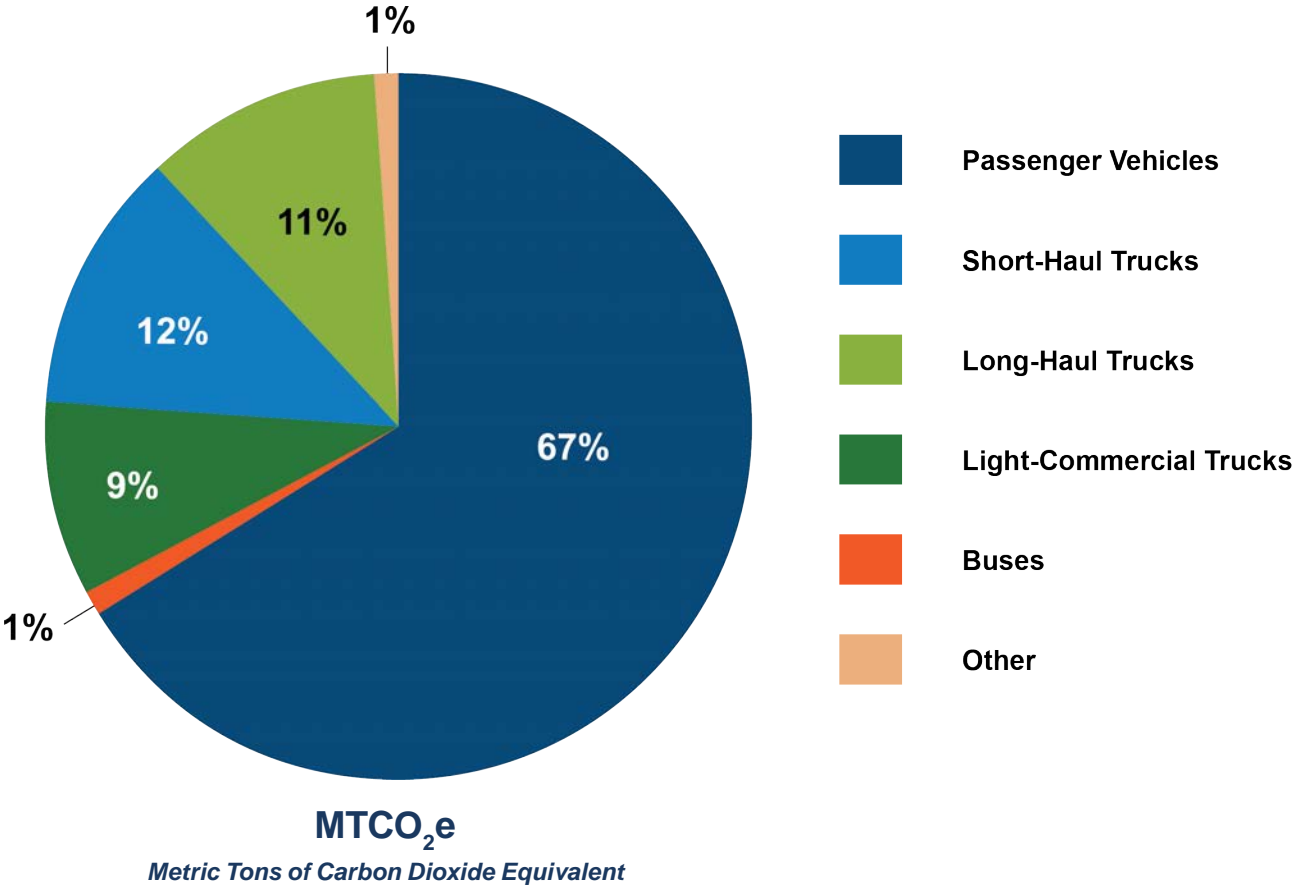
Lehigh County's transportation network emits more greenhouse gases than Northampton County's, which is likely due to a higher number of residents, jobs and vehicle miles traveled. When adjusted for population, both counties have similar rates of transportation emissions.

Vehicle Emissions in Lehigh and Northampton Counties



and passenger trucks, and are responsible for approximately two-thirds of the transportation emissions. Light-commercial trucks, such as delivery vans, account for 9% of emissions. Short-haul and long-haul trucks mainly consist of tractor-trailers and single-unit trucks, and they represent approximately 23% of transportation emissions, with short-haul and long-haul trips being roughly equal in terms of emissions.

Percent of Emissions by Vehicle Type

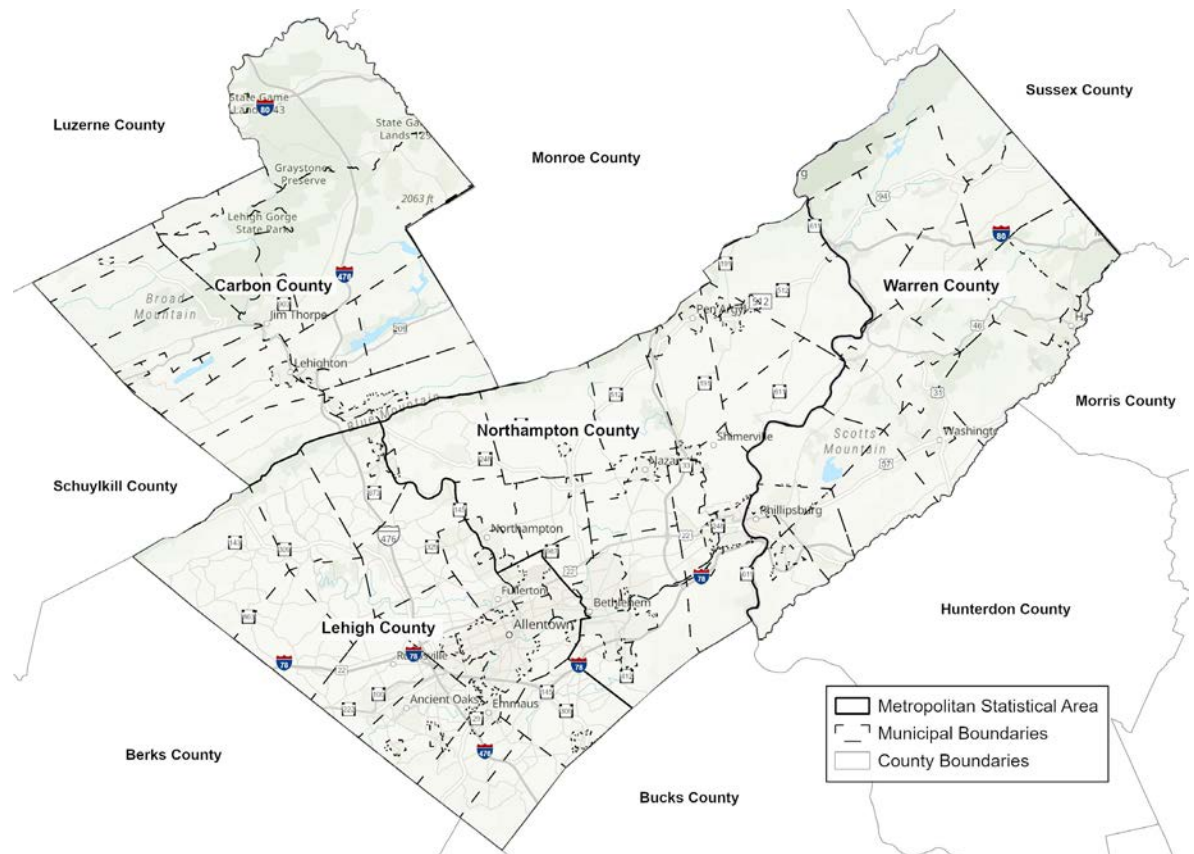


Metropolitan Statistical Area Greenhouse Gas Inventory

This section presents the greenhouse gas (GHG) emissions data from the transportation sector across all four counties included in the Allentown-Bethlehem-Easton Metropolitan Statistical Area (MSA): Lehigh, Northampton, Carbon and Warren. This data is included to provide a regional perspective and to compare the detailed analysis conducted specifically for the Lehigh Valley geography within the MSA described in the previous section.

Methodology

The MSA GHG transportation sector emissions are estimated using the 2020 National Emissions Inventory (NEI). NEI data from 2020 is used to display emissions on the MSA level, rather than the data from the Lehigh Valley 2021 inventory through MOVES, because the NEI provides the most recent estimate of emissions for all four counties in the MSA. The NEI is compiled by the EPA and houses comprehensive data of air pollutants, including transportation source emissions. In this plan, on-road mobile sources are considered transportation emissions.

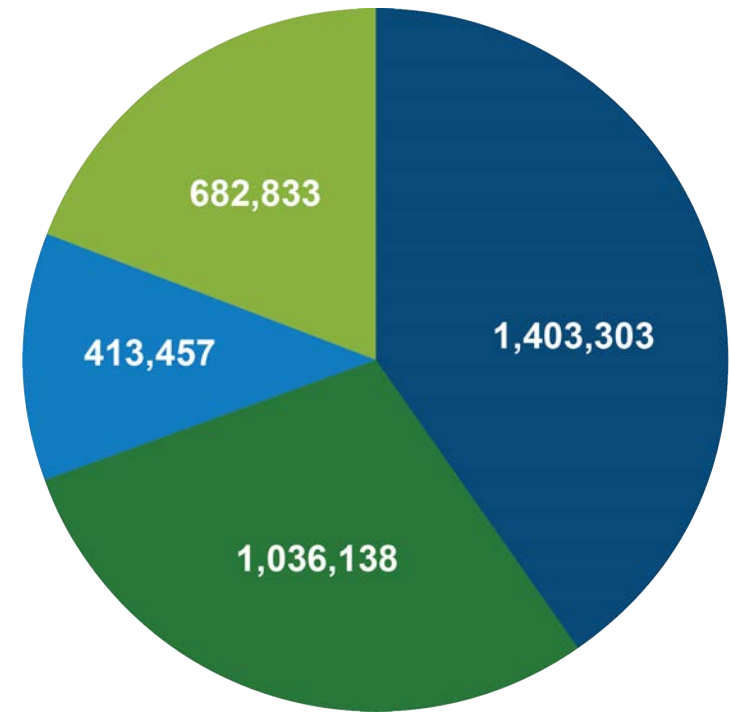


Emissions Data Overview

While the impacts from COVID-19 affected the transportation sector acutely in 2020, the NEI still provides representative data and fascinating insight regarding the status of emissions in the region. Remaining consistent with the 2021 Lehigh Valley inventory, Lehigh County produced the most transportation emissions in the region in 2020, followed by Northampton County. The Lehigh Valley accounts for approximately 69% of the MSA’s transportation emissions. Warren County produced the third most emissions, although significantly less than Lehigh and Northampton, and Carbon emitted the least. The concentration of emissions in Lehigh and Northampton counties is largely due to their higher populations and greater economic activity. When examining emissions on a per capita basis, the trend reverses, and Carbon and Warren counties emit roughly double the transportation emissions per capita of Lehigh and Northampton counties. This is a function of these counties being less densely populated, which makes them more dependent on vehicle travel.

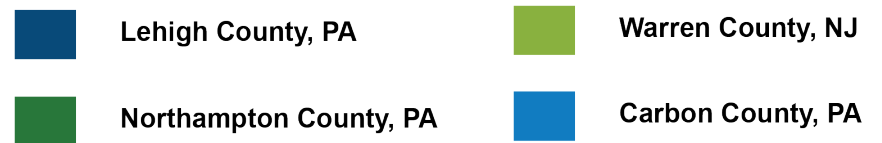
The data across all four counties underscores the urgent need for a comprehensive approach to reduce transportation-related emissions. The diverse set of goals set forth in this plan are essential for achieving the goals of transportation decarbonization and are vital for the overall success of climate action planning in the region. The transition to environmentally friendly transportation is not just beneficial for reducing emissions but also for improving air quality and public health.

Transportation Sector Greenhouse Gas Emissions for the Metropolitan Statistical Area



MTCO₂e

Metric Tons of Carbon Dioxide Equivalent



Greenhouse Gas Reduction Goals

Six priority greenhouse gas (GHG) reduction goals specifically tailored for transportation decarbonization are identified. These goals are designed to achieve significant GHG reductions, while aligning with adopted regional planning goals, strategies and actions, including benefits to low-income and disadvantaged communities (LIDAC), improving air quality, encouraging quality sustainable design and construction, and other co-benefits. Estimated GHG emission reductions are included with each goal. Corresponding methodology and supporting data are included in Appendix B.

- 1.** Implement *Walk/Roll/LV: Active Transportation Plan*.
- 2.** Increase transit ridership.
- 3.** Supporting deployment of alternative fuel vehicles (AFVs) of all types.
- 4.** Increase alternative fueling infrastructure and stations.
- 5.** Reimagine and retrofit major transportation corridors with green infrastructure.
- 6.** Plan and implement Intelligent Transportation Systems (ITS) technologies.



Integration of Land Use Planning and Transportation



GOAL 1

Implement *Walk/Roll/LV: Active Transportation Plan*

Incorporating planning for transit, bicycle and pedestrian networks within local and regional comprehensive plans can encourage development patterns that support multimodal transportation networks, complete streets and reduced trip lengths, preservation of open space and agricultural land, and provide convenient trail networks. Through supportive land use-transportation decisions, the ability for residents to choose non-automobile travel modes for their trips reduces the amount of greenhouse gas emissions from vehicles.

Target

Miles of priority bicycle corridors to add:

- ▶ 25% complete by 2030
- ▶ 50% complete by 2050

Priority sidewalk gaps to be fully completed by 2050.

GHG Reduction Estimates

2030 | 1,149 Metric Tons CO₂e

2050 | 1,200 Metric Tons CO₂e

Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- ▶ Increased mobility and accessibility to areas of the region that traditionally were only accessible via motorized transportation modes
- ▶ Connections to employment opportunities and educational and cultural resources
- ▶ Lower-cost travel options
- ▶ Health-supportive travel options
- ▶ Extension of the region's transit system, another low-cost travel mode
- ▶ Increased improvements to air quality and health outcomes

Direct Benefits

Infrastructure investments within LIDAC neighborhoods.

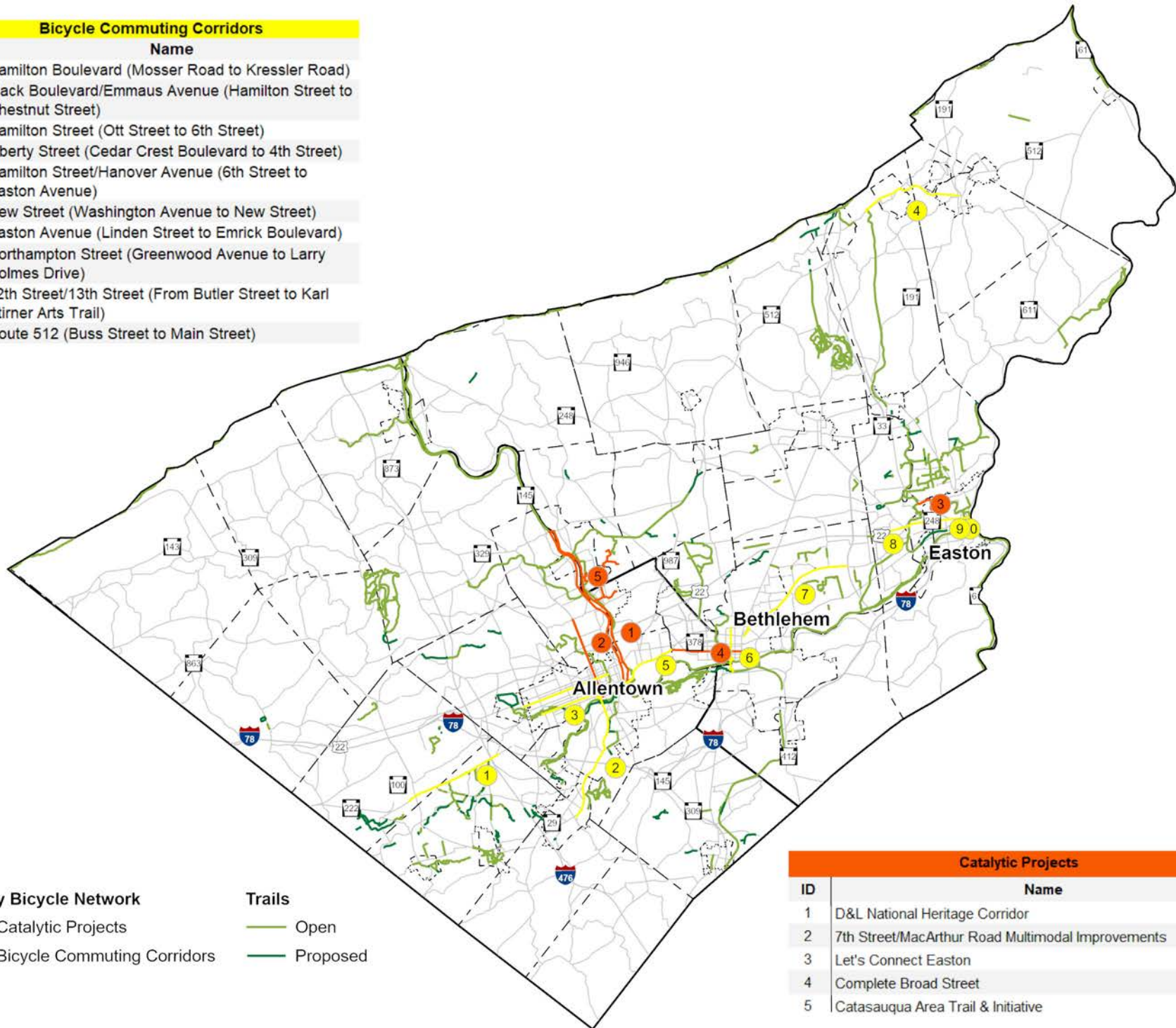
Indirect Benefits

External infrastructure investments connect LIDAC neighborhoods to other places.

Policies to increase alternative transportation and walkability would particularly benefit the MSA's low-income and disadvantaged communities located in areas with some of the region's lowest National Walkability Index scores, including Lower Nazareth to the east and south of Nazareth Borough; Forks Township east of Sullivan Trail; southern Bushkill Township adjacent to Nazareth Borough, and in Carbon County, northwest of Jim Thorpe and east of Palmerton.

Bicycle Commuting Corridors

ID	Name
1	Hamilton Boulevard (Mosser Road to Kressler Road)
2	Mack Boulevard/Emmaus Avenue (Hamilton Street to Chestnut Street)
3	Hamilton Street (Ott Street to 6th Street)
4	Liberty Street (Cedar Crest Boulevard to 4th Street)
5	Hamilton Street/Hanover Avenue (6th Street to Easton Avenue)
6	New Street (Washington Avenue to New Street)
7	Easton Avenue (Linden Street to Emrick Boulevard)
8	Northampton Street (Greenwood Avenue to Larry Holmes Drive)
9	12th Street/13th Street (From Butler Street to Karl Stirner Arts Trail)
10	Route 512 (Buss Street to Main Street)



Priority Bicycle Network

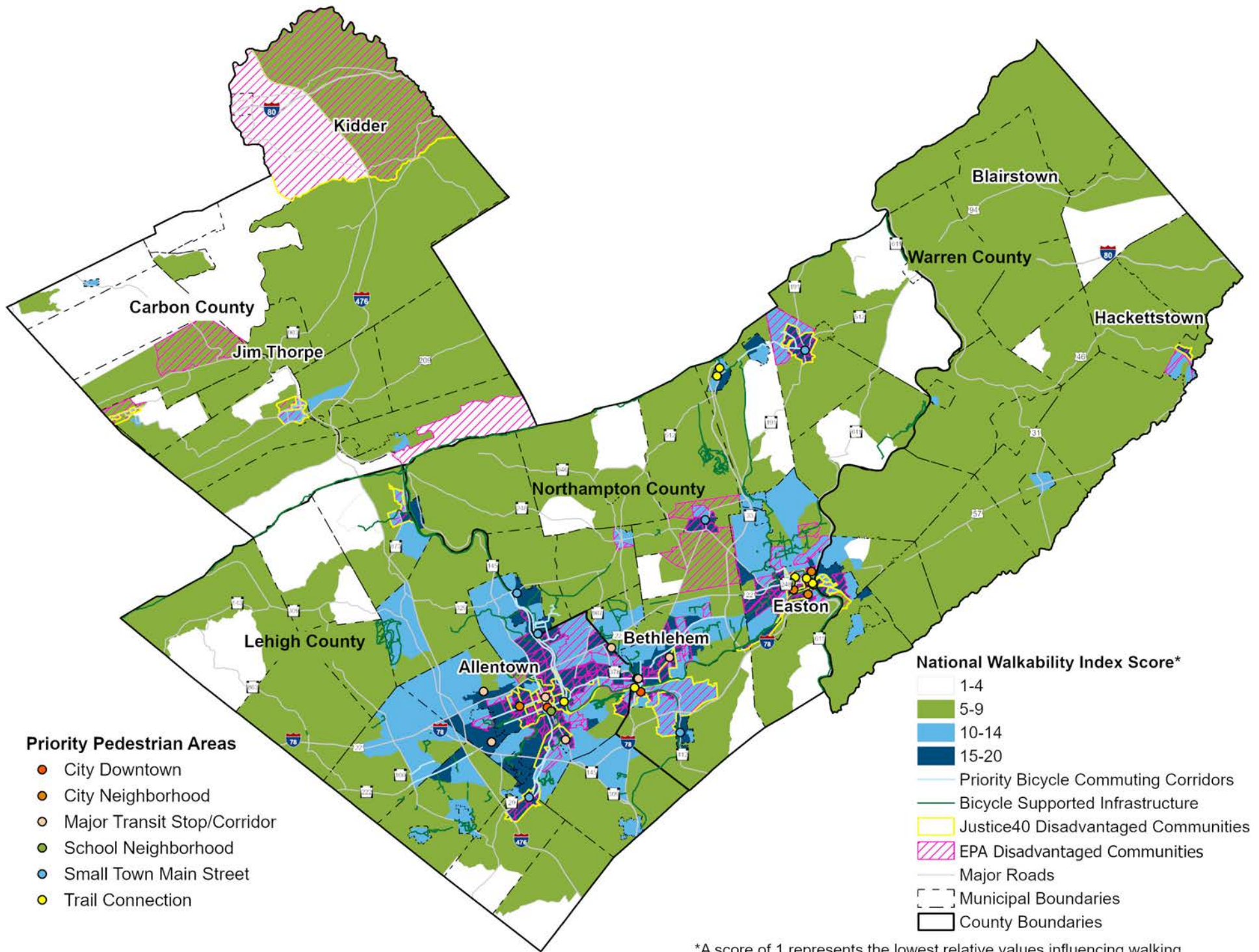
- Catalytic Projects
- Bicycle Commuting Corridors

Trails

- Open
- Proposed

Catalytic Projects

ID	Name
1	D&L National Heritage Corridor
2	7th Street/MacArthur Road Multimodal Improvements
3	Let's Connect Easton
4	Complete Broad Street
5	Catasauqua Area Trail & Initiative

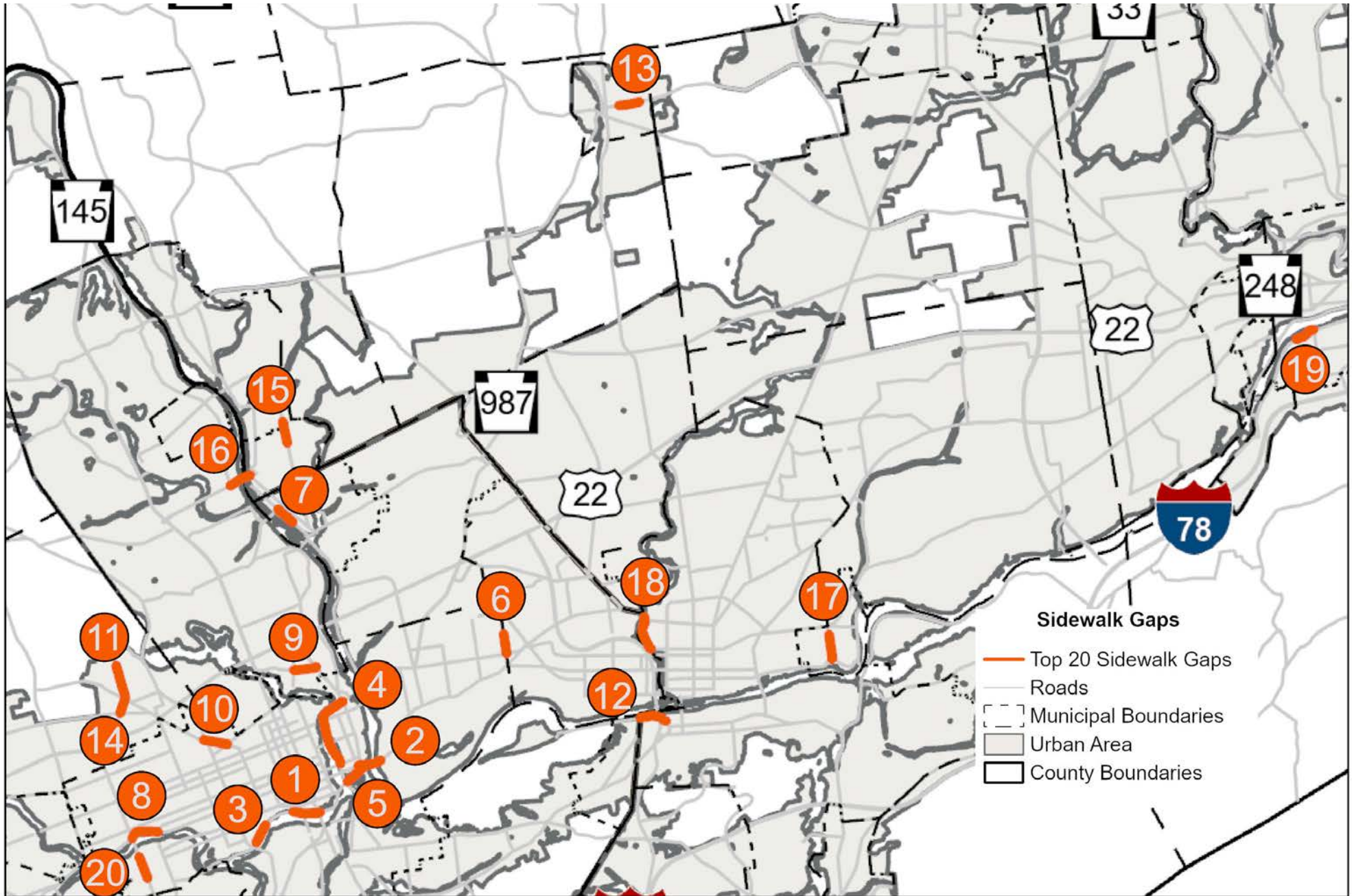


*A score of 1 represents the lowest relative values influencing walking

Goal 1: Implement *Walk/RollLV: Active Transportation Plan*

Implementing Agencies	Municipalities, Pennsylvania Department of Transportation, Lehigh County, Northampton County, LVPC/LVTS.
Authority to Implement	Municipalities have the authority to implement bicycle and pedestrian projects within their jurisdiction, which supports this goal. LVTS can allocate funding from various federal and state sources for projects that improve pedestrian and bicycle accessibility, and state Departments of Transportation (DOTs) and municipalities have final approval authority. For example, in 2024 and 2025, the LVTS, in coordination with PennDOT and USDOT, will develop a prioritization and selection process for the allocation of Transportation Alternatives Set-Aside (TASA) and Carbon Reduction funds, which are two major sources of funding for implementation of multimodal projects. Project location and selection can be assisted by active transportation and long-range transportation planning documents, which identify priority locations and corridors.
Milestones	Funding mechanism established for completion of priority bicycle network, pedestrian paths and related safety and accessibility projects. Completion of gap analysis to assist in prioritizing funding. Future development of a micromobility plan addressing bike/scooter share program business plan.
Implementation Schedule	5-10 years
Geographic Location	Identified Priority Bicycle Commuting Corridors and Catalytic Projects per <i>Walk/RollLV</i> and Priority Sidewalk Gaps per <i>Walk/RollLV</i> .

<p>Funding Sources</p>	<p>USDOT: Congestion Mitigation and Air Quality Improvement Program, Safe Streets for All, Surface Transportation Block Grant; US EPA: Climate Pollution Reduction Grant Implementation Grants; PA DCNR: Community Conservation Partnerships Program; PA DCED: Greenways, Trails, and Recreation Program; PennDOT: Transportation Alternatives Set-Aside, Carbon Reduction, Connects Program; Lehigh Valley Greenways Mini Grants, local government budgets, LVTS, private foundations.</p>
<p>Metrics</p>	<p>Increased bicycle and pedestrian traffic, increased use of electric assist bicycles, reduced vehicle usage, miles of trail constructed, number of trail and sidewalk gaps closed, number of active transportation/accessibility projects completed from the Long-Range Transportation Plan (LRTP)/Transportation Improvement Program (TIP).</p>
<p>Related LVPC Plan Goals</p>	<p><i>FutureLV: The Regional Plan</i></p> <ul style="list-style-type: none"> ▶ Efficient and Coordinated Development Pattern ▶ Connected Mixed-Transportation Region ▶ Safe, Healthy, Inclusive and Livable Communities <p><i>Walk/RollLV: Active Transportation Plan</i></p> <ul style="list-style-type: none"> ▶ Safety and Accessibility ▶ Convenience and Connectivity ▶ Seamless Multimodal Integration ▶ Regional Coordination ▶ Equity <p><i>Climate + Energy Element</i></p> <ul style="list-style-type: none"> ▶ To encourage alternatives to automobile use, both motorized and non-motorized.



Priority Sidewalk Gaps

Rank	Street Name	# of Sides	Length in Feet
1	Martin Luther King Jr. Drive (West)	1	1,851
2	Hamilton Street	1	1,618
3	Martin Luther King Jr. Drive (East)	1	1,343
4	American Parkway	2	5,130
5	West Union Street	2	1,814
6	Club Avenue	1	1,350
7	Front Street	1	1,331
8	Parkway Boulevard	2	1,999
9	Fairmont Avenue	2	1,551
10	Roth Avenue	1	1,642
11	Whitehall Avenue	1	1,641
12	Riverside Drive	2	1,861
13	Bath Pike	2	1,411
14	Whitehall Avenue	2	1,726
15	Howertown Road	1	1,502
16	Lehigh Street	1	1,542
17	Cambria Street	2	1,659
18	Mauch Chunk Road	2	1,386
19	Canal Street	1	1,386
20	South Ott Street	1	1,547

Part of what makes the region and Lehigh Valley so great is their diverse landscapes. There are populous, dense and historic cities and boroughs along with large areas of natural and agricultural lands. This diversity supports a variety of transportation modes. The density and form of many urban areas is conducive to increasing active transportation. The LVPC has identified ten bicycle commuting corridors and five catalytic corridors within the Lehigh Valley in *Walk/RollLV*. These are areas where there is a high transportation demand, and active transportation infrastructure improvements would be highly beneficial. In fact, the Broad Street catalytic corridor in Bethlehem has been selected as a recipient of national Safe Streets for All funding for multimodal infrastructure improvements along the corridor. The need for a safe and accessible active transportation network is a priority in the Lehigh Valley, including efforts such as the AARP/United Way of Greater Lehigh Valley/LVPC Walk Audit program.

In addition, there are many active transportation projects identified in the *FutureLV LRTP* project list and are in popular demand for funding. The region is also connected by a robust trail network that people can use to commute and visit natural areas. The Delaware & Lehigh National Heritage Trail is an extensive trail that connects Allentown, Bethlehem and Easton and runs through Lehigh, Jim Thorpe and the Lehigh Gorge in Carbon County. There are also many trails in Warren County, such as the Morris Canal Greenway and Paulinskill Valley Trail. Further connecting and improving the region's active transportation network will encourage people to walk, bike or roll rather than using motorized vehicles.

GOAL 2

Increasing transit ridership above current levels in the Lehigh Valley

Target

20% increase in transit passenger trips per capita by 2030 (9.0 transit passenger trips per capita) and a 40% increase in transit passenger trips per capita by 2050 (10.5 transit passenger trips per capita).

GHG Reduction Estimates

2030 | 1,833 Metric Tons CO₂e
2050 | 3,720 Metric Tons CO₂e

Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- ▶ Increased accessibility to desired travel destinations, such as educational and employment opportunities and essential services
- ▶ Improved viability of transit as an alternative transportation mode by reducing barriers, such as availability of transit stops, shelters from the elements and reducing time burdens because of bus frequency or trip travel times
- ▶ Increased travel options for low-income individuals who do not have access to a vehicle (zero-vehicle households)
- ▶ Increased use of public transportation can reduce traffic congestion, lowering emissions and improving air quality

Direct Benefits

Public transportation infrastructure investments in LIDAC neighborhoods improve usability of transit and reduce barriers to accessing areas where communities need to travel.

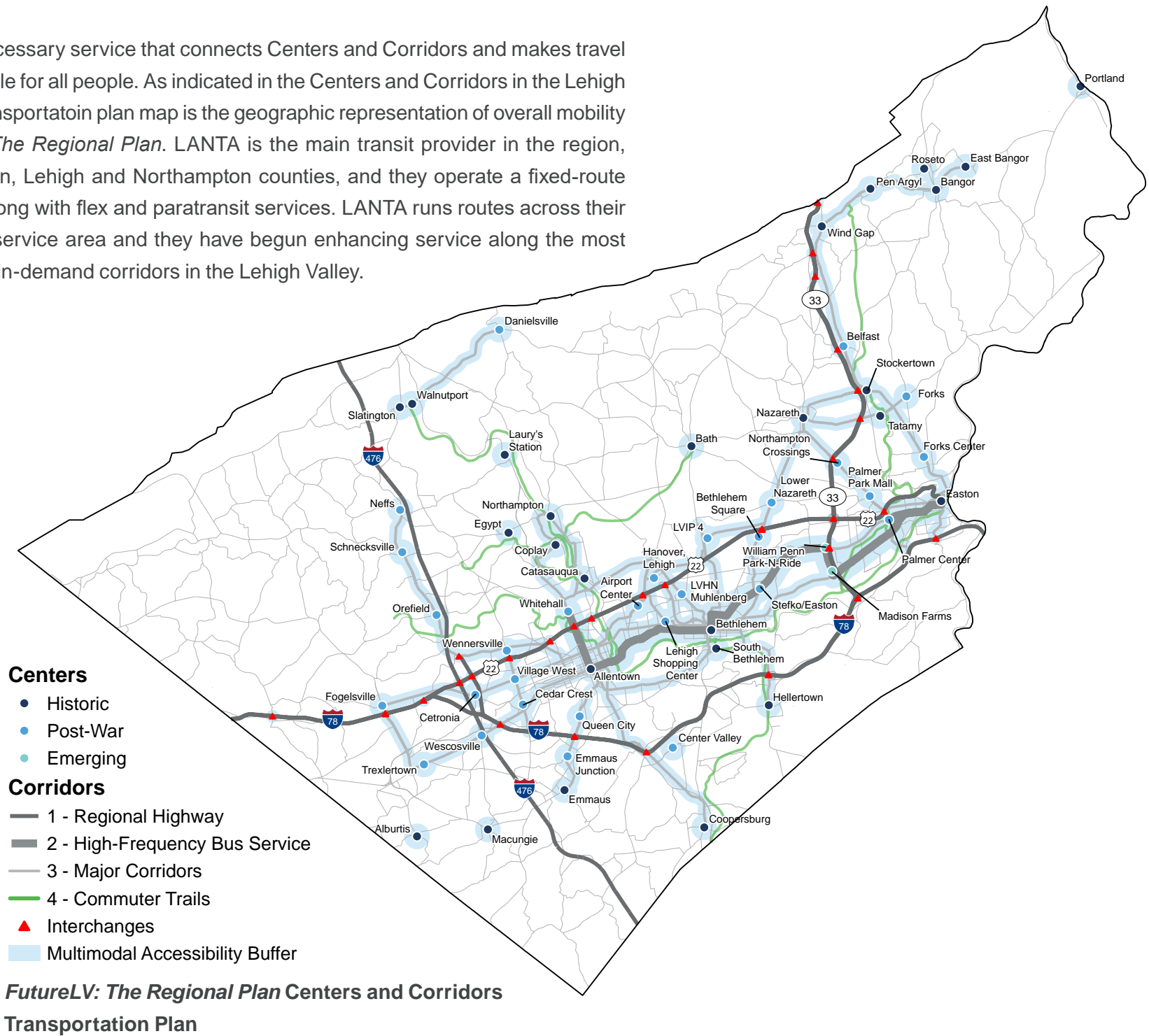
Indirect Benefits

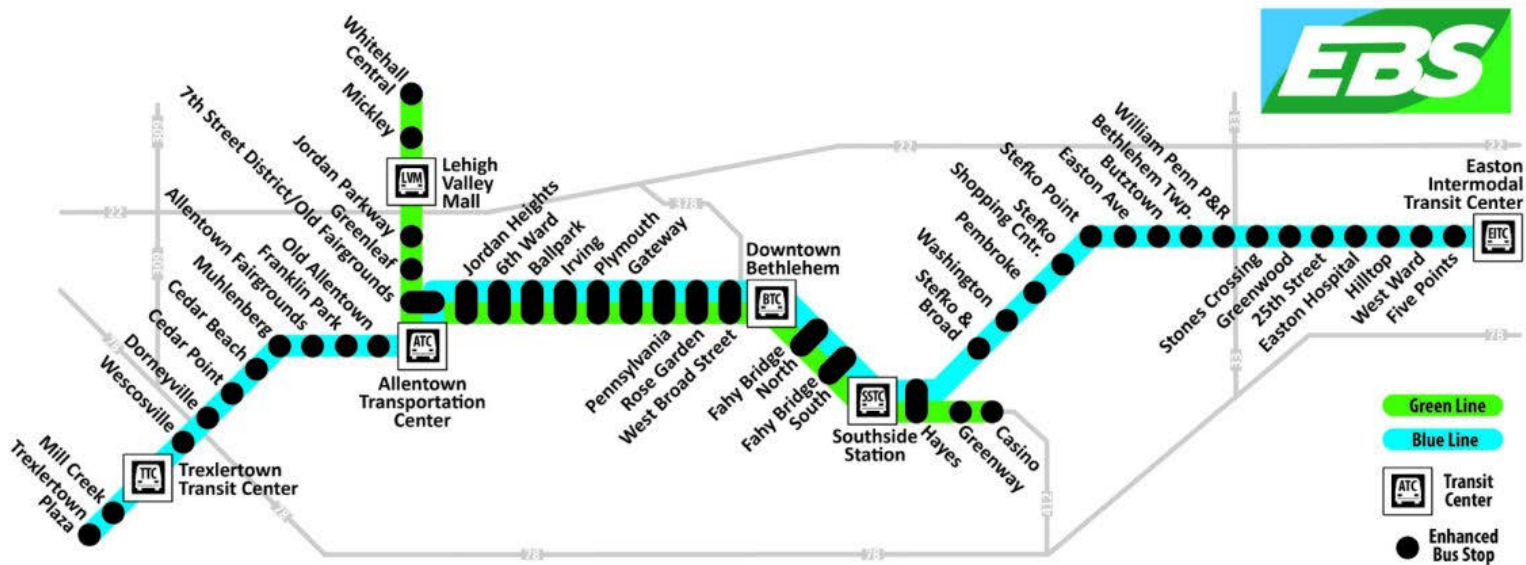
External infrastructure investments, such as at destination locations, support LIDAC use and accessibility to those locations.

Example: Well-designed bus shelters in shopping centers that may not be within LIDAC neighborhoods but are frequented by LIDAC as high employment centers.

LANTA provides transit service within nearly all the Lehigh Valley's identified low-income and disadvantaged communities. The southwestern portion of Bath Borough is the most notable area of the region, with identified low-income and disadvantaged communities that do not have any transit service available, and no service is provided in the vicinity. Areas of Forks Township just north of the City of Easton are not served directly by transit but have transit service available nearby along Sullivan Trail. In Carbon County, low-income and disadvantaged communities northwest of Jim Thorpe and east of Palmerton also have transit service available nearby but are not served directly by transit. Transit investments would be particularly beneficial to these communities.

Transit is a necessary service that connects Centers and Corridors and makes travel more accessible for all people. As indicated in the Centers and Corridors in the Lehigh Valley, this transportation plan map is the geographic representation of overall mobility in *FutureLV: The Regional Plan*. LANTA is the main transit provider in the region, serving Carbon, Lehigh and Northampton counties, and they operate a fixed-route bus service along with flex and paratransit services. LANTA runs routes across their three-county service area and they have begun enhancing service along the most populous and in-demand corridors in the Lehigh Valley.

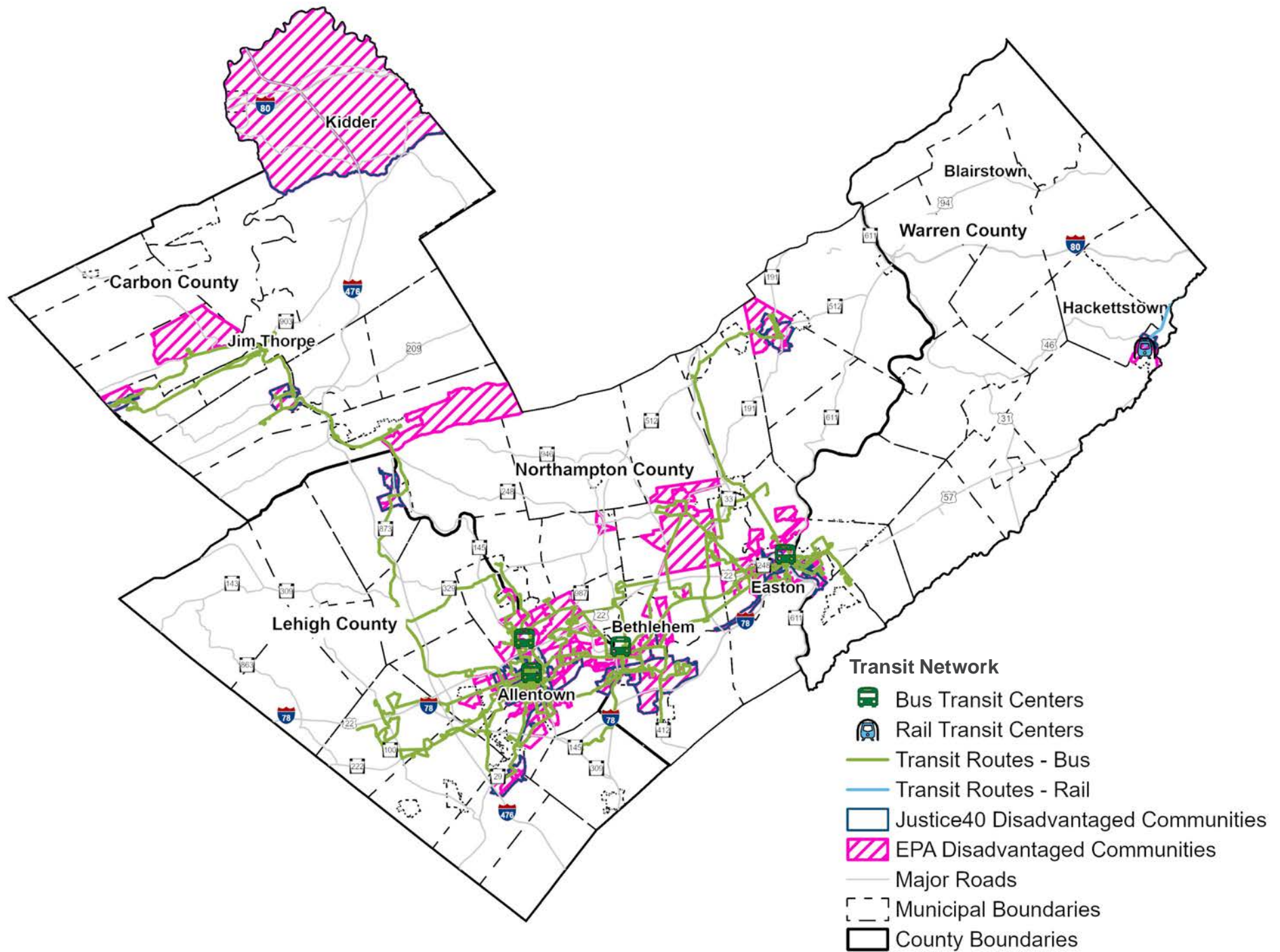




Enhanced Bus Service (EBS) is LANTA's branding for its bus rapid transit (BRT) operations. BRT is a more robust version of traditional bus service, as it includes elements of light rail, such as dedicated station and ticketing infrastructure, higher frequencies and limited stop or express service, while maintaining the flexibility and cost efficiencies of buses. Currently, LANTA is in the early phases of their EBS BRT plan and operates two EBS routes with limited stop service and minimal on-street infrastructure.

LANTA is in the process of upgrading bus station infrastructure, and as EBS progresses, LANTA aims to improve bus frequency, expand the route network and coordinate with PennDOT and municipalities to install bus-specific infrastructure to speed up service. Bus service improvements will not only benefit current riders but also attract new riders, which will take vehicles off the road and reduce emissions. In addition, bus service promotes the revitalization of the Lehigh Valley's urban core and encourages economic activity along route corridors.

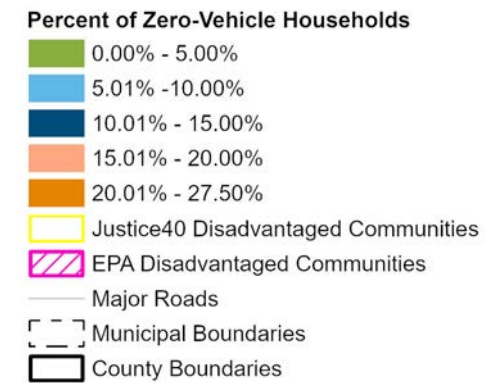
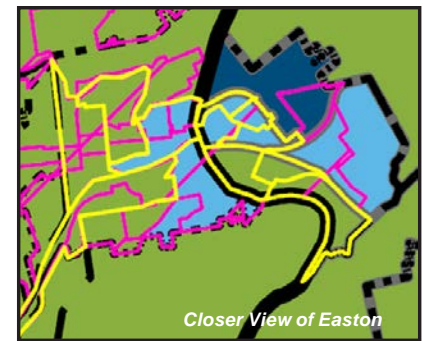
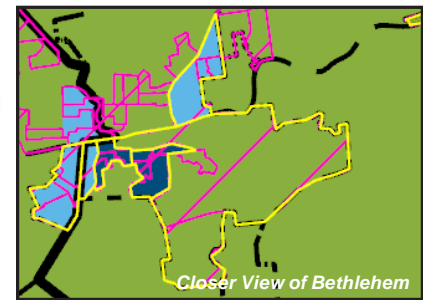
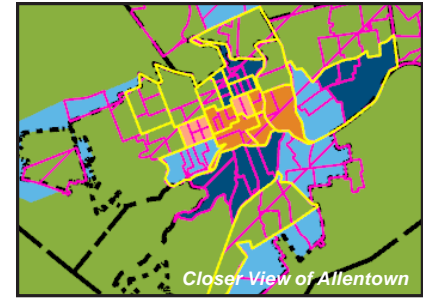
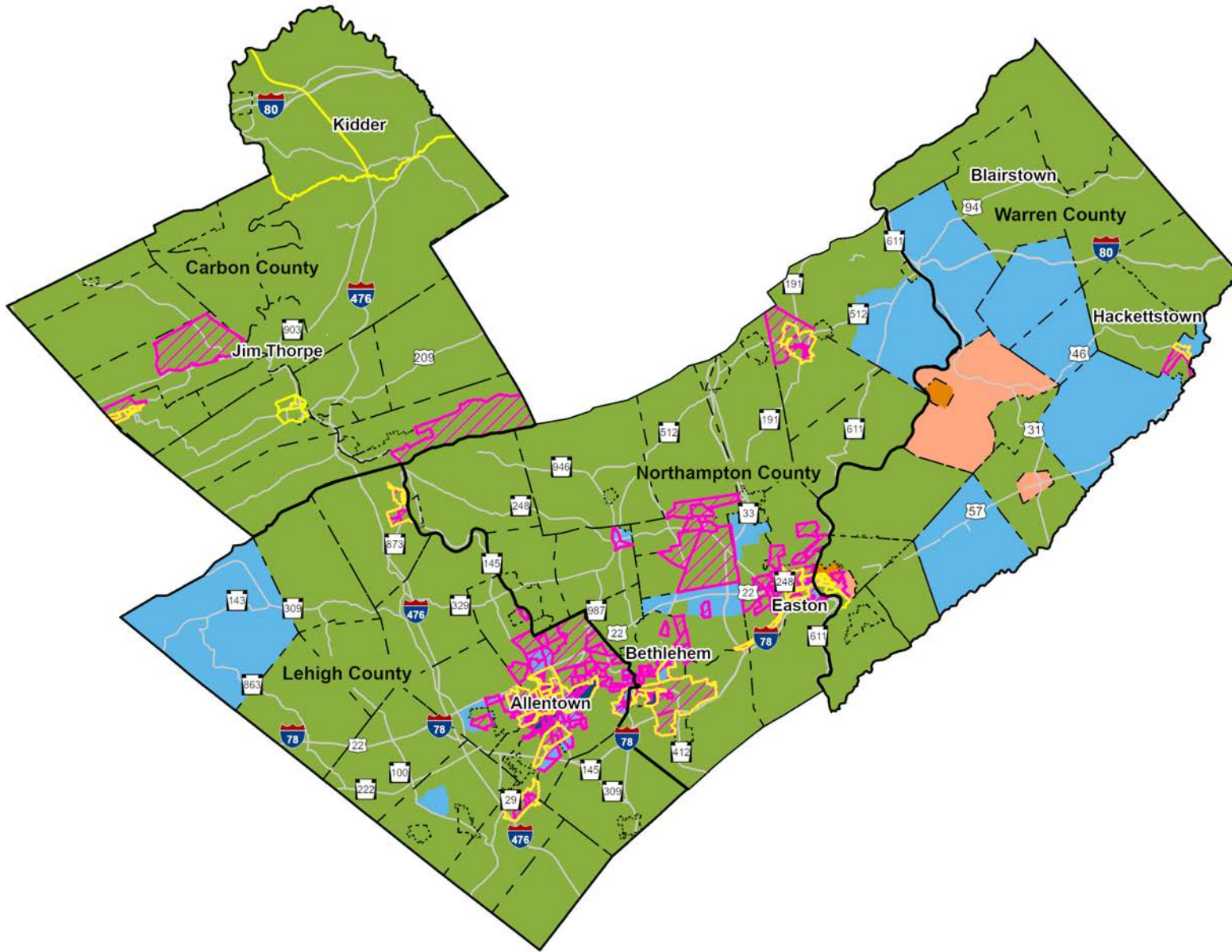
Warren County does not receive service from LANTA; however, riders can transfer from LANTA to NJ Transit buses at the Easton Transportation Center. NJ Transit provides transit service in Warren County, along with the Warren County Transportation system, which operates shuttle bus routes within the county. Along with buses, Warren County has a passenger rail station in Hackettstown, which receives regional rail service to and from Newark/New York City, operated by NJ Transit. The Lehigh Valley does not currently receive passenger rail service; however, studies are underway to determine its feasibility.



It is critical for transit service to not only be available to low-income and disadvantaged communities but also provide access to key destinations, such as educational institutions, healthcare and job centers with frequent, consistent and predictable service throughout the day and night. Transit availability is also critical in areas with a high concentration of households that do not have access to any vehicles (zero-vehicle households). The number of zero-vehicle households is significant because the Lehigh Valley, like many regions across the country, is largely car dependent. In a car-centric society, not having access to a vehicle can limit access to critical needs, including employment, educational opportunities, healthcare, daycare and grocery stores. It can also substantially increase the burden of time required to move between locations. About 7.4% of Lehigh Valley households do not have a vehicle available, the equivalent of 19,383 households. Those households are primarily concentrated in core urban areas where there are more mode options available (Allentown, Bethlehem and Easton cities), but zero-vehicle households also expand beyond city boundaries into suburban and rural townships and boroughs where alternative modes are more limited, if available at all.

A lack of vehicle availability disproportionately affects low-income and disadvantaged communities and communities of color. In the Lehigh Valley, people of color and the Hispanic or Latinx population are much more likely to live in areas where a high concentration of households do not have access to a vehicle: 28.8% of people of color and 34.7% of people identifying as Hispanic or Latinx, compared to 3.7% of people identifying as White Alone. Additionally, a person who is Black, Indigenous or a person of color is nearly three times more likely to commute to work via alternative transportation modes, including public transportation, walking, biking, rideshare or some other means (9.1% people of color compared to 3.6% of White, Non-Hispanic) (US Census Bureau American Community Survey, 2017-2021 5-Year Estimates).

The number of zero-vehicle households is significant because the Lehigh Valley, like many regions across the country, is largely car dependent.



Goal 2: Increasing transit ridership above current levels in the Lehigh Valley

Implementing Agencies	LANTA, LVPC/LVTS, municipalities.
Authority to Implement	LANTA has the authority to expand its service. Funds to do so can come from its budget, funding from federal programs, or action by the state legislature. LVTS can also allocate certain funding to transit agencies from federal programs. Further, LVTS and municipalities can encourage transit ridership by investing in multimodal accessibility projects that enhance connectivity to transit stops, and the LVPC and municipalities can support transit-friendly land development and redevelopment.
Milestones	Completion of LANTA's Enhanced Bus Service Plan's six phases, completion of bus infrastructure upgrades, implementation of expanded routes, progress towards passenger rail.
Implementation Schedule	3-12 years, as resources are available.
Geographic Location	LANtaBus service areas, regional metropolitan areas.
Funding Sources	USDOT: Carbon Reduction Program, Congestion Mitigation and Air Quality Improvement Program, Surface Transportation Block Grant; US EPA: Climate Pollution Reduction Grant Implementation Grants; Federal Transit Administration (FTA) grants; public-private partnerships.
Metrics	Ridership numbers, frequency of service, expansion of current routes/number of new routes, number of new vehicles in fleet.

Related LVPC Plan Goals	<p><i>FutureLV: The Regional Plan</i></p> <ul style="list-style-type: none"> ▶ Efficient and Coordinated Development Pattern ▶ Connected Mixed-Transportation Region ▶ Safe, Healthy, Inclusive and Livable Communities
	<p><i>Walk/RollLV: Active Transportation Plan</i></p> <ul style="list-style-type: none"> ▶ Safety and Accessibility ▶ Convenience and Connectivity ▶ Seamless Multimodal Integration ▶ Regional Coordination ▶ Equity
	<p><i>Climate + Energy Element</i></p> <ul style="list-style-type: none"> ▶ To encourage alternatives to automobile use, both motorized and non-motorized.



Transition to Clean Low-Carbon/Zero-Emissions Fuels



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GOAL 3

Supporting deployment of alternative fuel vehicles (AFVs) of all types

Increased investment in low-carbon fuel and vehicle technologies is a critical component of transportation decarbonization. Transitioning to clean and sustainable fuel options/vehicles, such as electric vehicles, fuel cell electric vehicles (powered by hydrogen generated from low-carbon sources) and biomass fueled vehicles, is expected to drive the majority of emissions reductions in the United States (US Department of Energy, 2023).

These innovations need to be paired with supporting alternative fueling infrastructure that is readily available and accessible to all users. Rapid adoption of these practices may be constrained due to the need to increase generation of power within the existing power distribution network, including substations and utility lines, to meet increased use of alternative fuel vehicles. In addition, there are major limitations currently in battery technologies.

Target

Increase share of alternative fueled vehicle (AFV) registration to 9% by 2030 and 21% by 2050 consistent with projections in PennDOT's EV Mobility Plan.

GHG Reduction Estimates

2030 | 285,957 Metric Tons CO₂e

2050 | 297,013 Metric Tons CO₂e

Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- ▶ Increased availability of alternative fuel vehicles
- ▶ Reduced asthma rates due to improved air quality

Direct Benefits

Increasing the prevalence of AFVs also increases their availability and can reduce the upfront cost to obtain them; reduced emissions improve air quality and support better health outcomes for low-income and disadvantaged communities.

Indirect Benefits

The proliferation of AFVs reduces transportation emissions and improves air quality overall, thus improving health outcomes for low-income and disadvantaged communities.

The Transportation and Mobile Sources sector is one of the Lehigh Valley's largest contributors to greenhouse gas emissions, most of which is generated by on-road gasoline vehicle travel. Air quality impacts resulting from vehicle emissions are exacerbated in low-income and disadvantaged communities, where 12% of people of color and 14.7% of those who identify as Hispanic or Latinx suffer from asthma, compared to 1.5% of people identifying as White Alone. Efforts to reduce transportation emissions and investments in alternative transportation options help to improve adverse health impacts tied to poor air quality.

Several low-income and disadvantaged communities in the Lehigh Valley are located in areas at or above the 90th percentile of Particulate Matter 2.5 (PM 2.5) and Ozone nationwide: In Center City Allentown along North 7th Street and to the west and east, southwest of Route 22 and Cedar Crest Boulevard, east side Allentown south of Hanover Avenue and between the Lehigh River and Susquehanna Street; in the City of Bethlehem west of Stefko Boulevard and north of the Lehigh River, north of Fahy Bridge and east of Old York Road, and in Southside Bethlehem along 4th Street and Hayes Street; and in Fountain Hill Borough north of Broadway to the west.

In addition to areas of the Lehigh Valley, where high rates of PM 2.5 and Ozone overlap, the City of Easton north of Lehigh Drive is between the 90th and 95th percentile nationwide for Ozone.

Measures taken to increase deployment of AFVs would improve air quality and greatly benefit the low-income and disadvantaged communities mentioned above, as well as low-income and disadvantaged communities in Carbon and Warren counties that have high degrees of exposure to PM 2.5 and Ozone.

Goal 3: Supporting deployment of alternative fuel vehicles (AFVs) of all types

Implementing Agencies	Vehicle manufacturers, businesses/organizations, state legislative bodies and associated regulatory agencies, transit authorities, local governments, power and fuel generation and distribution companies.
Authority to Implement	The LVPC/LVTS and other planning organizations and MPOs can coordinate with state and federal agencies to support programs that make AFVs more accessible and attainable for all. Many strategies to reduce the cost burden of AFVs require the authority of federal or state legislation, such as the federal EV tax credit, however, car manufacturers can also provide consumers with cash back programs to incentivize sales. Organizations such as transit authorities, school districts, municipalities and private companies can increase adoption of AFVs by switching their fleets to these vehicles.
Milestones	EV or AFV sales milestones relating to fleet transition.
Implementation Schedule	Ongoing with annual targets, gradual increase in AFV percentages over 5-10 years.
Geographic Location	Metropolitan Statistical Area
Funding Sources	USDOT: Carbon Reduction Program; US EPA: Climate Pollution Reduction Grant Implementation Grants, Clean School Bus Program; Federal EV Tax Credit; public-private partnerships, private initiatives.
Metrics	Number of AFVs sold/registrations from base year, percent increase in alternative fueled government fleet vehicles and percent of commercial light- and heavy- duty trucks transitioned to hybrid and/or fossil free fuels.

Related LVPC Plan Goals	<i>FutureLV: The Regional Plan</i> <ul style="list-style-type: none"> ▶ Protected and Vibrant Environment ▶ Connected Mixed-Transportation Region
	<i>Walk/RollLV: Active Transportation Plan</i> <ul style="list-style-type: none"> ▶ Air Quality and Climate
	<i>Climate + Energy Element</i> <ul style="list-style-type: none"> ▶ To encourage alternatives to automobile use, both motorized and non-motorized.

Adoption targets included in this plan are based on the trajectory from the 2022 *Pennsylvania State Plan for Electric Vehicle Mobility*. The adoption rate for alternative fueled vehicles can vary widely based on federal policy setting mileage standards and providing tax incentives for purchasers. PennDOT data indicates AFVs comprised 1.88% of total vehicles registered in 2022 in the Lehigh Valley.

Long-haul trucking, which greatly affects the Lehigh Valley and is one of its biggest environmental challenges, will need to transition to hybrid or other fueling mechanisms to operate in a greener way. Air Products (one of the Fortune 500 companies in the Lehigh Valley) is developing technology with Mack Trucks to address this need.

The number of zero-vehicle households is significant because the Lehigh Valley, like many regions across the country, is largely car dependent.

GOAL 4

Increase alternative fueling infrastructure and stations

Innovations in the development of clean or zero-emissions fuel technology need to be paired with continuing federal and state support for the development of alternative fueling infrastructure and deployment. As more vehicles transition to these low-carbon alternatives, supporting fueling/recharging infrastructure must similarly be scaled up to match the demand and be widely accessible and convenient to users.

Target

Increase alternative fueling infrastructure by 25% by 2030 and 40% by 2050 over 2022 baseline in line with PennDOT goals.

GHG Reduction Estimates

2030 | 5,644 Metric Tons CO₂e

2050 | 13,791 Metric Tons CO₂e

Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- ▶ Increased availability of alternative fuel vehicles
- ▶ Reduced asthma rates due to improved air quality

Direct Benefits

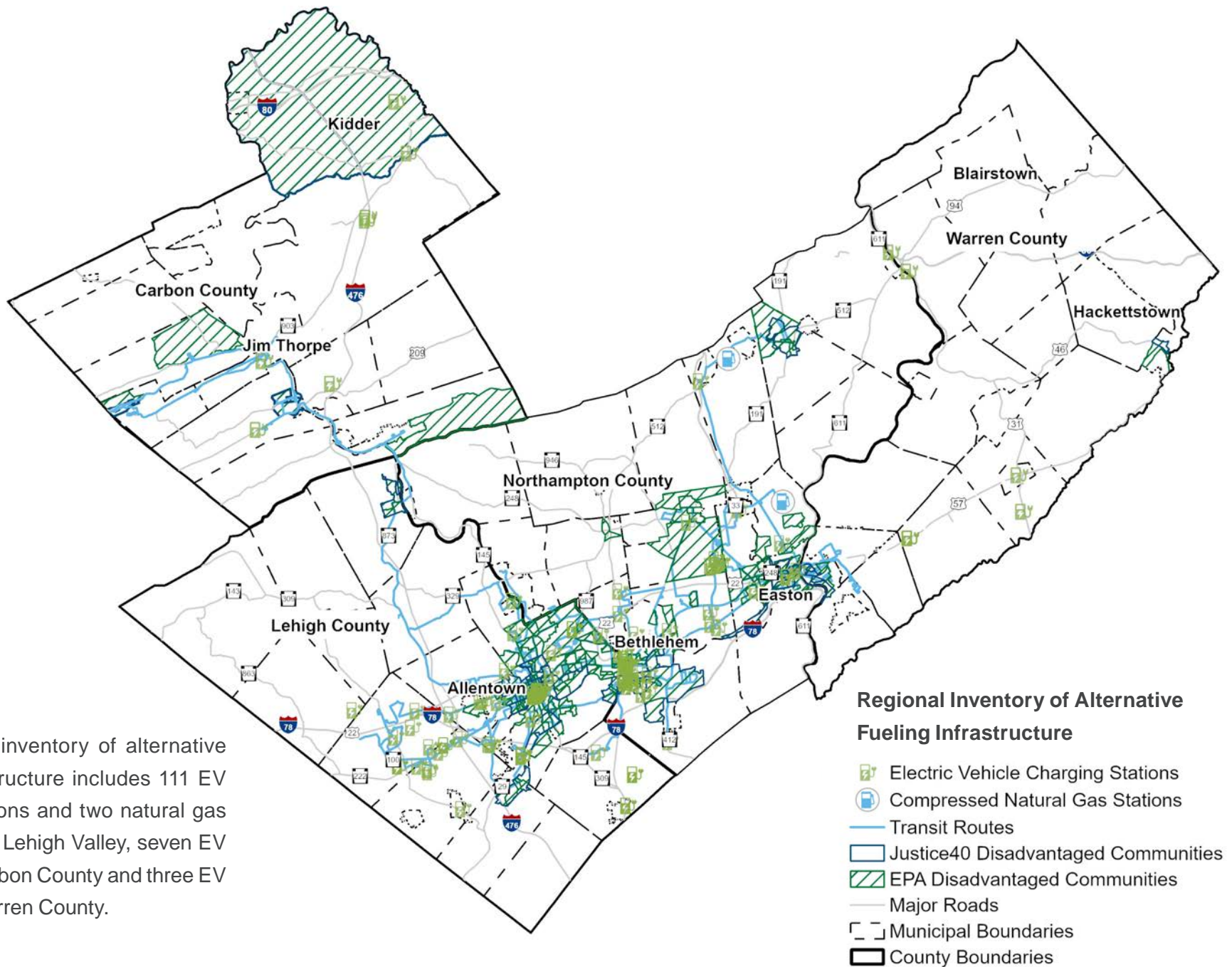
Developing AFV infrastructure in LIDAC neighborhoods reduces barriers to AFV ownership.

Indirect Benefits

The proliferation of AFVs reduces transportation emissions and improves air quality, thus improving health outcomes for low-income and disadvantaged communities.

Clean or zero-emissions fueling infrastructure is a key component to supporting AFVs, sharing the same benefits of increasing the deployment of AFVs. The lack of fueling infrastructure is often a significant impediment to AFV ownership, and increasing available infrastructure in LIDAC neighborhoods reduces barriers to obtaining AFVs. Additionally, providing fueling infrastructure within LIDAC neighborhoods makes AFV ownership more cost-effective by eliminating the need to travel further out of one's way for fueling.

While clean or zero-emissions fueling infrastructure is largely available within the Lehigh Valley's identified low-income and disadvantaged communities, LIDAC neighborhoods outside of the Lehigh Valley's core in particular can benefit from direct alternative fuel infrastructure investments: Slatington Borough, Bangor Borough, Roseto Borough and northernmost Washington Township in Northampton County, the southwestern portion of Bath Borough, Emmaus Borough and the western and southern areas of Southside Bethlehem. Each of the LIDAC neighborhoods in Carbon County lack zero-emissions fueling infrastructure and would benefit from investments, including northwest of Jim Thorpe, Lansford and Lehighton and east of Palmerton. In Warren County, Phillipsburg and Hackettstown also can benefit from direct alternative fuel infrastructure investments.



The regional inventory of alternative fueling infrastructure includes 111 EV charging stations and two natural gas stations in the Lehigh Valley, seven EV stations in Carbon County and three EV stations in Warren County.

Goal 4: Increase alternative fueling infrastructure and stations

Implementing Agencies	<p>Vehicle manufacturers, businesses/organizations, federal and state legislative bodies and associated regulatory agencies, transit authorities, MPOs, local governments, power and fuel generation and distribution companies.</p>
Authority to Implement	<p>The LVPC/LVTS and other MPOs and planning organizations can use multiple methods to help expand the region’s charging network. Planning organizations can recommend alternative fueling infrastructure to be included when applicable in land development reviews. Local governments can require alternative fueling infrastructure in land development projects via specific standards/criteria within zoning or subdivision and land development regulations. Another method is to allocate funding for alternative fuel infrastructure projects, as MPOs select projects for certain federal funding programs. Extensive collaboration is needed to implement this goal because many alternative fueling stations are constructed by private companies, and utility companies will also need to upgrade grid infrastructure to continually allow for greater fueling capacity.</p>
Milestones	<p>Enhancements to modernize the existing power grid to accommodate new fueling infrastructure. Funding and regulatory support to advance battery and engine design technologies, especially for heavy-duty and long-haul trucks. Funding for and development and construction of new charging/fueling infrastructure for a variety of fueling options, accessible broadly to all communities.</p>
Implementation Schedule	<p>Ongoing and alignment with technological advancements and projected vehicle conversion rates, with annual targets.</p>
Geographic Location	<p>Metropolitan Statistical Area</p>

Funding Sources	USDOT: National Electric Vehicle Infrastructure Program, Congestion Mitigation and Air Quality Improvement Program, Carbon Reduction Program; US EPA: Climate Pollution Reduction Grant Implementation Grants; private investment, state funds, federal incentives, potential public-private partnerships.
Metrics	Number of new charging/alternative fueling stations added, including in LIDAC communities.
Related LVPC Plan Goals	<p><i>FutureLV: The Regional Plan</i></p> <ul style="list-style-type: none"> ▶ Protected and Vibrant Environment ▶ Connected Mixed-Transportation Region
	<p><i>Walk/RollLV: Active Transportation Plan</i></p> <ul style="list-style-type: none"> ▶ Air Quality and Climate
	<p><i>Climate + Energy Element</i></p> <ul style="list-style-type: none"> ▶ To encourage alternatives to automobile use, both motorized and non-motorized.



Green Infrastructure



GOAL 5

Reimagine and retrofit major transportation corridors with green infrastructure

Green infrastructure refers to the interconnected network of open spaces and natural areas, often used to manage stormwater, improve water quality and reduce hazard impacts to public health and safety. Examples include urban forests, parks, green roofs, natural drainage systems and low impact development. When communities utilize and enhance their natural environmental assets as an integral part of their infrastructure, they can reduce their impact on climate change and increase their ability to adapt to changes that may occur.

Traditional methods have focused on enhancing fuel efficiency and transitioning to electric vehicles. However, these approaches, while critical, tackle only a part of the problem. The LVPC recognizes the necessity for a more comprehensive strategy, one that includes carbon sequestration as a key component in transportation decarbonization. This innovative approach aims to capture and store atmospheric CO₂, thereby reducing the overall carbon footprint of the transportation network.

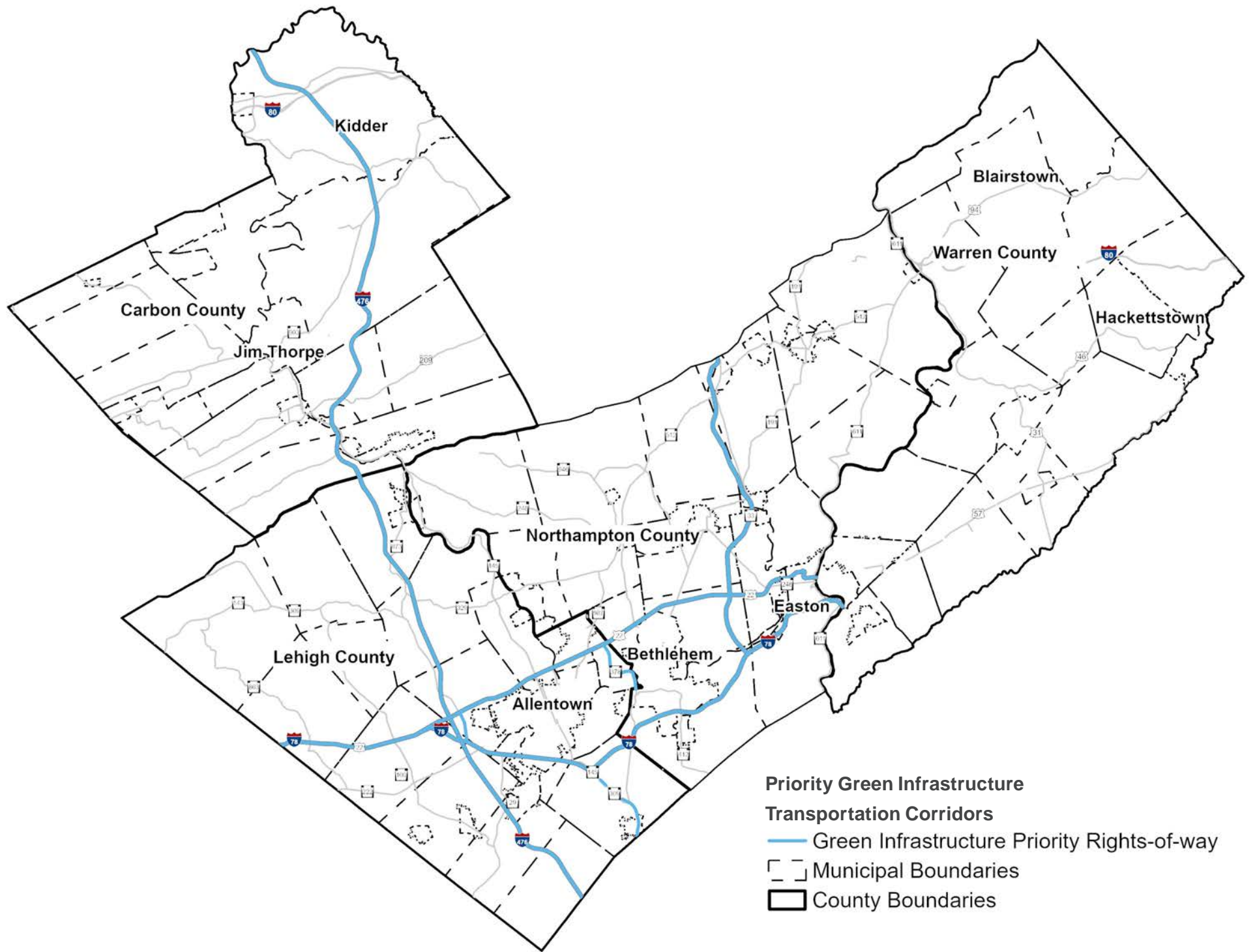
Integrating carbon sequestration into transportation infrastructure signifies a revolutionary step in environmental management. It involves capturing atmospheric CO₂ and storing it in a manner that prevents it from contributing to global warming. This can be achieved through various methods, such as using carbon-absorbing materials in road construction, urban greening along transportation corridors and integrating biochar in landscaping. By implementing these techniques, the LVPC aims to create a transportation network that facilitates movement and actively contributes to the reduction of greenhouse gases.

Target

This goal includes phasing, starting with landscaping retrofits of approximately 462 acres along Route 22 and expanding to other major corridors, with the goal to increase landscaped-based solutions along all corridors by at least 50% by 2050.

Estimate of GHG Emissions Reductions from Landscaping Enhancements

Regional Corridors	Estimated ROW Available for Greening in Acres*	Potential 2030 GHG Reductions (MTCO ₂ e per year)**	2050 (MTCO ₂ e)
Route 22	462	388.08	388.08
Route 33	599	Future Phase	503.16
Interstate 78	1,065	Future Phase	894.60
Interstate 476	619	Future Phase	519.96
Route 309	108.44	Future Phase	91.09
Route 378	79.91	Future Phase	67.12
Total	2,933.35	388.08	2,464.01



Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- ▶ **Enhanced resiliency of low-income and disadvantaged communities vulnerable to the impacts of climate change.**
- ▶ **Reduced heat island effects.**
- ▶ **Reduced impacts resulting from extreme weather events, such as flooding.**
- ▶ **Increased carbon sequestering improves air quality and reduces adverse health outcomes.**
- ▶ **Increased presence of natural areas improves aesthetics of an area and supports mental health.**

Direct Benefits

Improvements within LIDAC neighborhoods increase climate resiliency for LIDAC properties, preventing property damage or loss during extreme weather events.

Indirect Benefits

Investments outside of LIDAC neighborhoods that target flood sources can prevent property damage or loss within LIDAC neighborhoods.

Within the Lehigh Valley, many low-income and disadvantaged communities are concentrated in more developed areas with a high proportion of grayscape, such as in cities and boroughs. In particular, Center City Allentown and Southside Bethlehem are at the 90th percentile nationwide for share of land area covered by impervious surface.

LIDAC neighborhoods in urban areas are susceptible to extreme heat and urban island effects as temperatures rise, and heat islands are made worse by vehicle exhaust in areas with a high proximity to traffic. Converting impervious areas to natural spaces and reducing traffic in developed areas can significantly improve temperature conditions for low-income and disadvantaged communities, while also helping with other climate change impacts, such as flooding and air quality. While Carbon and Warren counties do not have any areas at or above the 90th percentile nationwide for share of land area covered by impervious surface, benefits identified above would also serve low-income and disadvantaged communities in Carbon and Warren that are in more developed areas with a high proportion of grayscape.

Goal 5: Reimagine and retrofit major transportation corridors with green infrastructure

<p>Implementing Agencies</p>	<p>PennDOT, Pennsylvania Turnpike Commission, LVPC/LVTS, municipalities</p>
<p>Authority to Implement</p>	<p>Municipalities can require green infrastructure/carbon sequestration measures be prioritized in land development projects via specific standards/criteria within zoning, subdivision and stormwater regulations. The LVPC, through its stormwater ordinance regulatory oversight power, can assure consistency with adopted stormwater provisions. The LVTS can allocate funding from various sources towards green infrastructure projects on state and locally owned roads. However, state agencies and municipalities have final approval authority over these projects. Additionally, the Pennsylvania Turnpike Commission has authority over green infrastructure efforts on the Pennsylvania Turnpike.</p>
<p>Milestones</p>	<p>Phase I: Assessment, Planning and Grant Application (Months 1-2)</p> <ul style="list-style-type: none"> ▶ Environmental impact assessments and strategic planning. ▶ Preparation and submission of the EPA grant application. <p>Phase II: Pilot Implementation (Months 7-18)</p> <ul style="list-style-type: none"> ▶ Implementation of carbon sequestration techniques. ▶ Monitoring and evaluation of pilot projects. <p>Phase III: Full-Scale Implementation (Months 19-36)</p> <ul style="list-style-type: none"> ▶ Expansion of successful techniques along the routes. ▶ Continued community engagement and educational initiatives. <p>Phase IV: Ongoing Monitoring and Adaptation (Months 37-onwards)</p> <ul style="list-style-type: none"> ▶ Long-term monitoring and strategy refinement.

Implementation Schedule	3-5 years for Phase I, 2029-2032 for Phase II, 2033-2036 for Phase III and 2036 and beyond for Phase IV.
Geographic Location	Route 22 initially, followed by Route 33, I-78, I-476, Route 378 and 309.
Funding Sources	USDOT: Carbon Reduction Program; US EPA: Climate Pollution Reduction Grant Implementation Grants; LVTS, municipalities.
Metrics	Lawn and impervious areas converted to forested areas or meadows, number, size and type of trees planted, number of nature-based stormwater control measures constructed, volume of stormwater managed via nature-based systems.
Related LVPC Plan Goals	<p><i>FutureLV: The Regional Plan</i></p> <ul style="list-style-type: none"> ▶ Protected and Vibrant Environment
	<p><i>Climate + Energy Element</i></p> <ul style="list-style-type: none"> ▶ To promote energy efficiency and natural resources conservation within existing and new buildings and land development.



Transportation Systems Management and Operations



GOAL 6

Plan and implement Intelligent Transportation Systems (ITS) technologies.

The integration of Transportation Systems Management and Operations (TSMO) strategies into the Priority Climate Action Plan represents a forward-thinking approach to decarbonization and efficient resource utilization. By focusing on reducing congestion, particularly on regional highways and major corridors as outlined in the Long-Range Transportation Plan (LRTP), these strategies are key in creating a more sustainable transportation network.

The *FutureLV* initiative serves as a cornerstone in this endeavor, merging strategic planning and transportation mapping into a cohesive blueprint for the future. This plan emphasizes not just the movement of people and goods, but also the environmental implications of transportation. Prioritizing TSMO strategies achieves a dual objective: enhancing the efficiency of the transportation system while simultaneously reducing vehicle miles traveled (VMT).

Reducing congestion is a critical component of this strategy. Congestion leads to increased emissions due to idling and stop-and-go traffic and contributes to time loss and decreased economic efficiency. By implementing TSMO strategies, such as optimizing traffic signal timings, managing road space and promoting real-time traffic information systems, the region can significantly reduce congestion. These goals not only make transportation more efficient but also contribute to lowering greenhouse gas emissions.

For this goal, TSMO strategies are prioritized for regional highways and major corridors as outlined in the *FutureLV: The Regional Plan*. This includes, but is not limited to, 207 miles of regional highways and 188 miles of major corridors in the Lehigh Valley, which includes congested corridors.

Target

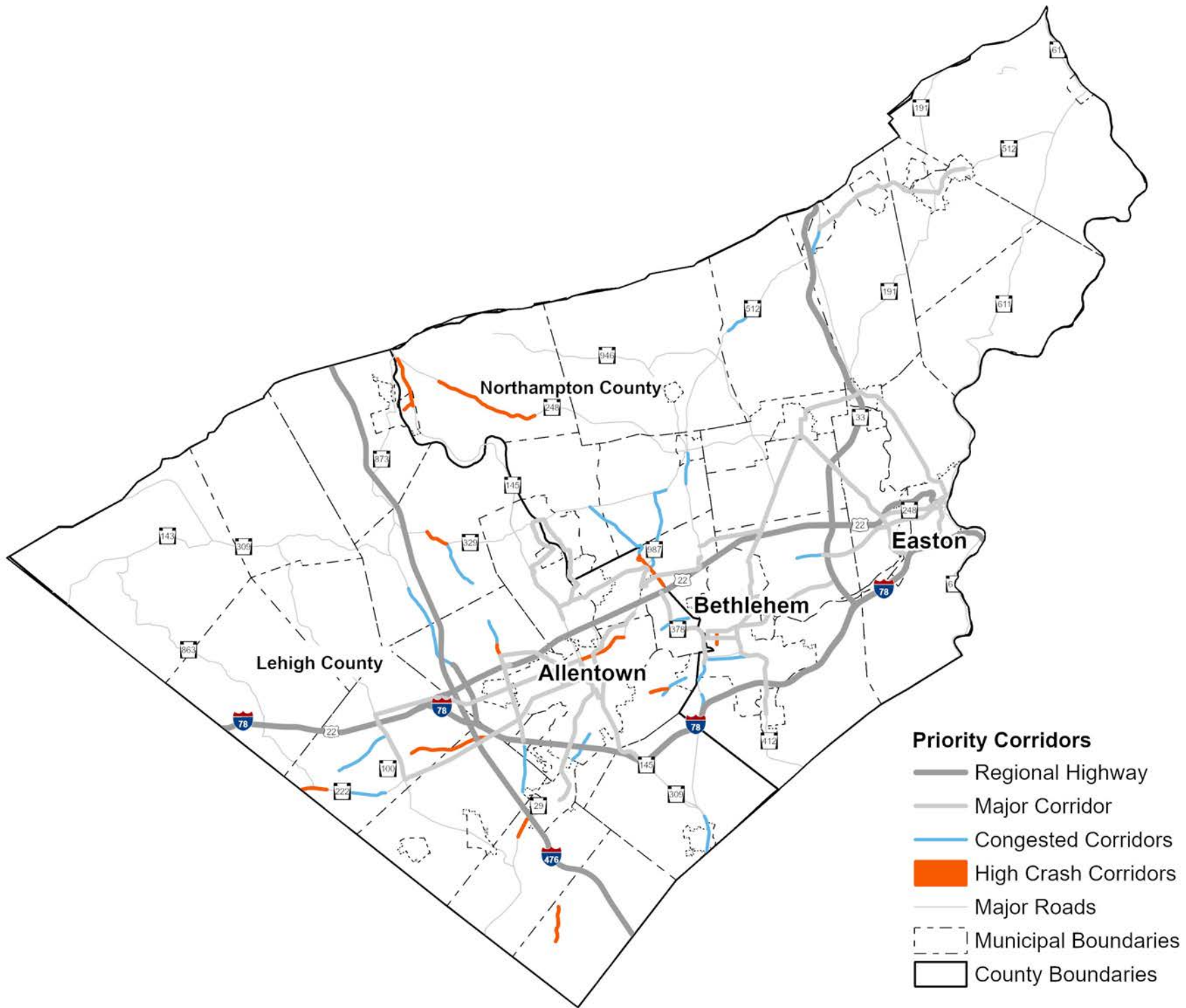
By 2030, Transportation Systems Management and Operations (TSMO) strategies are projected to be fully integrated along all regional roadways experiencing major congestion. These goals include adaptive signal control, real-time traffic monitoring and dynamic lane usage to enhance flow. Additionally, ramp metering, incident management systems and integrated corridor management will be utilized to optimize roadway capacity and reduce bottlenecks, significantly improving travel times and reducing emissions due to stop-and-go traffic.

GHG Reduction Estimates

2030 | 2,527 Metric Tons CO₂e

2050 | 2,010 Metric Tons CO₂e*

**TSMO and some other strategies may have less benefit in future years because the cars will be cleaner.*



Benefits to Low-Income and Disadvantaged Communities (LIDAC)

- ▶ Improved air quality
- ▶ Reduced noise pollution
- ▶ Improved traffic safety

Direct Benefits

Efforts directed to reduce traffic within LIDAC neighborhoods improve air quality and reduce adverse health outcomes, such as asthma, reduce the health impacts of noise pollution and increase traffic safety.

Indirect Benefits

Traffic reduction outside of LIDAC neighborhoods improves air quality overall.

Several low-income and disadvantaged communities in the Lehigh Valley are located in areas at or above the 90th percentile of traffic proximity: In the City of Allentown, Center City, East Allentown, north of Susquehanna Street and southeast of Route 22 and Cedar Crest Boulevard; in Whitehall Township southeast of Route 22 and MacArthur Road; in the City of Bethlehem, northwest and southwest of Route 22 and Schoenersville Road, South Bethlehem along Bethlehem's Main Street and east of Stefko Boulevard; southwest Bath Borough; and in the City of Easton along Larry Holmes Drive and Lehigh Drive and along Northampton Street at Wood Avenue; in Warren County, southern and southwestern Hackettstown and the eastern and southern areas of Phillipsburg. It is of note that high traffic proximity is located at the four Route 22 interchanges centrally located in the Lehigh Valley: the 15th Street interchange, Cedar Crest interchange, 7th Street/MacArthur Road interchange and Route 378 interchange.

Goal 6: Plan and implement Intelligent Transportation Systems (ITS) technologies.

<p>Implementing Agencies</p>	<p>PennDOT, LVTS, municipalities. The implementing agencies for TSMO initiatives typically include state departments of transportation (like PennDOT and NJDOT), metropolitan planning organizations (like LVTS, NEPA and NJTPA) and municipalities. These agencies work collaboratively to plan, fund and execute transportation projects aimed at enhancing traffic flow and safety, reducing congestion and improving overall transportation infrastructure efficiency. The successful implementation of TSMO goals may involve engagement with the community, coordination with emergency services and partnerships with private sector stakeholders to leverage the latest technologies and practices in traffic management.</p>
<p>Authority to Implement</p>	<p>For the Lehigh Valley’s specific TSMO projects, agencies include USDOT, PennDOT, LVTS and municipalities:</p> <ul style="list-style-type: none"> ▶ USDOT can establish nationwide or statewide TSMO strategies and provide funding and policy guidance for state, regional and local implementation. ▶ PennDOT has the authority to implement TSMO projects on state roadways. They are responsible for statewide transportation planning, funding allocation and adherence to federal and state transportation regulations. ▶ LVTS, as the MPO for the Lehigh Valley, has the authority to conduct regional transportation planning and to prioritize projects for funding from both state and federal sources. ▶ Municipalities have the authority to implement TSMO goals on local roadways. This includes adopting traffic ordinances, approving the installation of traffic control devices and enhancing local road infrastructure.

<p>Milestones</p>	<p>Phase I</p> <ul style="list-style-type: none"> ▶ Project approval and funding allocation, technology acquisition and deployment, operational launch of Phase I, data collection and analysis, community engagement and feedback. <p>Phase II Expansion</p> <ul style="list-style-type: none"> ▶ Advanced technology integration, performance review, reporting and documentation, sustainable practices integration, continuous improvement.
<p>Implementation Schedule</p>	<p>2-4 years for Phase I and 2029-2032 for Phase II. There are currently five TSMO projects in the Lehigh Valley TIP falling within the Phase I and II timelines.</p>
<p>Geographic Location</p>	<p>TSMO projects will be distributed along regional highways and key corridors as delineated in the <i>FutureLV</i> Centers + Corridors Transportation Plan Map, targeting areas with the highest congestion and potential for emission reductions.</p>
<p>Funding Sources</p>	<p>Federal Funding: EPA Climate Pollution Reduction Grants, USDOT CMAQ Program, Federal Transit Administration, Surface Transportation Block Grant Program.</p> <p>State Funding: PennDOT’s Statewide TSMO Funding, Automated Red Light Enforcement Funding, Multimodal Transportation Fund, Green Light-Go Program, Act 89 Transportation Plan, State Transportation Innovation Council Incentive Program, Bond Financed Programs, Pennsylvania Infrastructure Bank.</p> <p>Local Funding: Local government budgets, regional transportation authorities, public-private partnerships, private sector investment.</p> <p>Innovative Financing Tools: Transportation Infrastructure Finance and Innovation Act Loans.</p>

<p>Metrics</p>	<p>Percentage reduction in peak hour traffic congestion and associated greenhouse gas emissions, improvement in traffic safety and operational efficiency, adoption rates of ITS and utilization of optimized infrastructure, ratio of cost savings to investment and public satisfaction with transportation improvements.</p>
<p>Related LVPC Plan Goals</p>	<p><i>FutureLV: The Regional Plan</i></p> <ul style="list-style-type: none"> ▶ Connected Mixed-Transportation Region ▶ Safe, Healthy, Inclusive and Livable Communities
	<p><i>Walk/RollLV: Active Transportation Plan</i></p> <ul style="list-style-type: none"> ▶ Air Quality and Climate ▶ Emerging Technologies



Low-Income and Disadvantaged Communities Benefits Analysis

Historical inequities and policies related to transportation infrastructure, environmental justice and climate change over our nation’s history have disproportionately affected low-income populations and communities of color.

Policy decisions such as freeway construction, suburbanization and transit underinvestment have resulted in negative consequences for these communities. Efforts to combat climate change today can also unintentionally become inequitable or exclusionary for several reasons that are often tied to historical and systemic factors. The LVPC and LVTS aim to understand and address historical inequities as a crucial foundation for developing comprehensive and equitable strategies that mitigate the impacts of climate change, while ensuring that vulnerable populations are not further marginalized or disproportionately burdened by environmental challenges. Addressing these issues requires a conscious effort to incorporate principles of environmental justice into climate policies, ensuring that strategies are inclusive, considerate of historical disparities and actively work to avoid perpetuating or exacerbating existing racial and economic inequalities.

Proximity to Polluting Industries

Historically, industrial facilities and hazardous waste sites have been disproportionately located in or near low-income neighborhoods and communities of color. This practice, known as environmental racism, exposes these populations to higher levels of pollution and environmental hazards, contributing to adverse health effects and reduced quality of life.

Communities that have historically faced environmental racism, such as the siting of polluting industries in their neighborhoods, may be skeptical of new environmental initiatives. If past injustices are not acknowledged and addressed, these communities may resist or be excluded from climate change solutions.

Redlining and Segregation

Redlining policies in the United States systematically denied financial services to residents of certain neighborhoods, often based on racial and socioeconomic factors. This resulted in the concentration of environmental hazards in marginalized communities, as these areas were denied the resources for infrastructure development and were left vulnerable to the impacts of climate change.

Lack of Access to Green Spaces

Low-income communities and neighborhoods with predominantly non-white populations often lack access to green spaces and urban parks. This lack of green infrastructure contributes to the urban heat island effect, leading to higher temperatures and increased vulnerability to heat-related illnesses.

Displacement Risk

Climate change-related events, such as sea-level rise, extreme weather events and wildfires, can lead to displacement and migration. Low-income communities often lack financial and social resources and face challenges in relocating, which can exacerbate social inequalities.

Climate resilience goals, such as infrastructure improvements and green initiatives, can also inadvertently result in displacement. As neighborhoods become more resilient to climate change, property values may rise and lead to the displacement of existing low-income residents, many of whom are part of marginalized racial or ethnic groups.

Economic Disparities in Access to Green Technologies

The transition to green technologies and sustainable practices may create economic barriers. For example, electric vehicles and solar panels can be expensive, making them less accessible to low-income individuals. Without targeted policies to address affordability and accessibility, the benefits of clean technology may not be equitably distributed.

Health Disparities

Exposure to environmental pollutants and climate-related health risks, such as heatwaves and air pollution, has historically been higher in low-income communities and communities of color. This exposure contributes to health disparities, including higher rates of respiratory diseases, cardiovascular problems and other adverse health outcomes.

Inequitable Access to Climate Information

Vulnerable communities may lack access to timely and relevant information about climate change and its impacts. This information gap can hinder their ability to prepare for and respond to climate-related challenges, exacerbating existing disparities in resilience and adaptability.

Unequal Distribution of Environmental Benefits and Burdens

Climate mitigation and adaptation strategies may inadvertently result in an unequal distribution of benefits and burdens. For example, policies promoting the use of renewable energy sources might disproportionately benefit wealthier communities, while low-income communities, often communities of color, may bear the brunt of the impacts of pollution and environmental degradation.

Lack of Representation in Decision-Making

Historically, communities of color and low-income populations have been underrepresented in decision-making processes, including those related to environmental policies. A lack of representation results in policies that may not adequately consider or address the specific needs and concerns of these communities, perpetuating existing social and environmental injustices.

Environmental Justice and Low-Income and Disadvantaged Communities

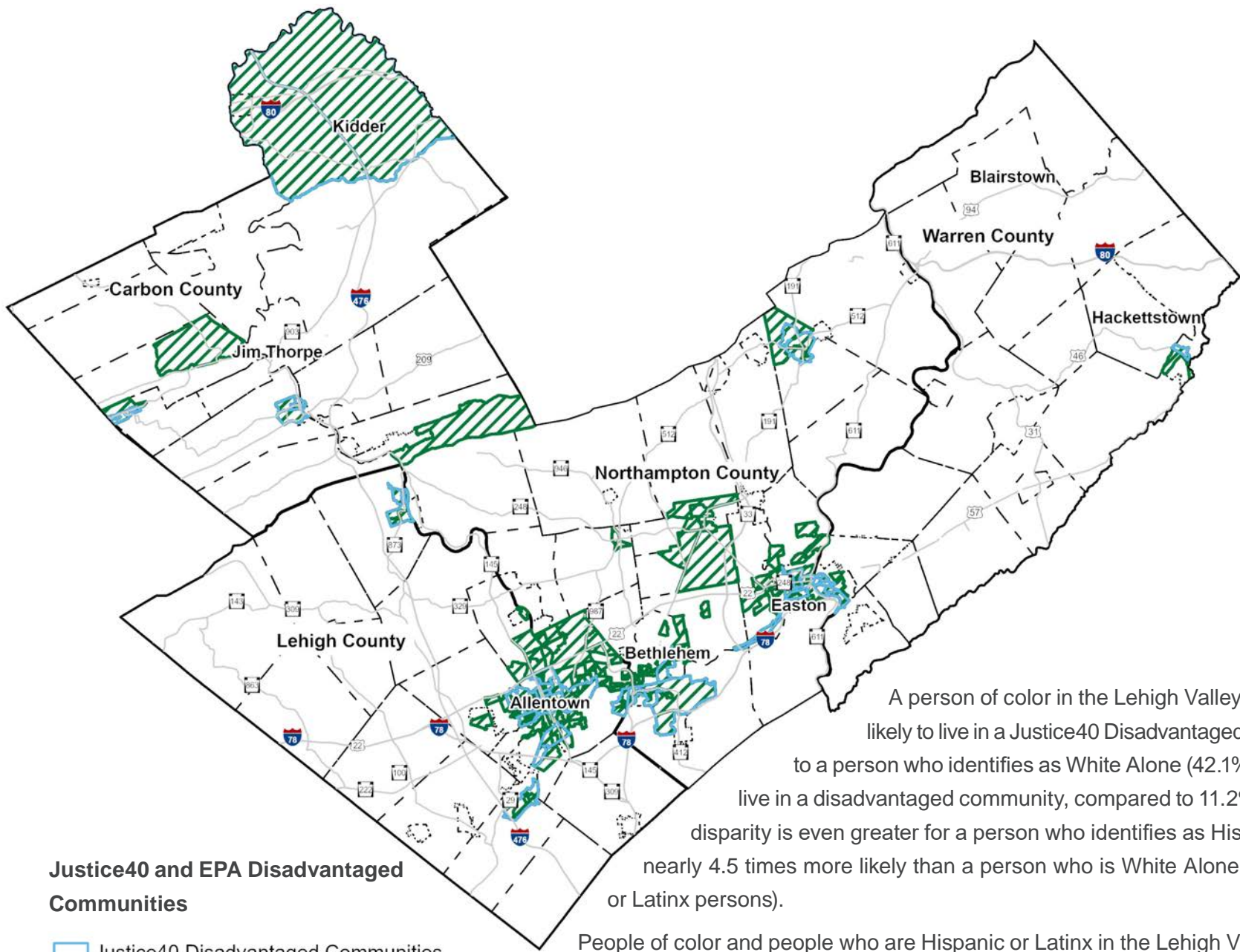
The US Environmental Protection Agency's definition of environmental justice contains two conditions:

1. Meaningful involvement of all people regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.
2. No group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies.

This plan abides by the Justice40 directive set by the Biden Administration. It aims to address historical underinvestment in disadvantaged communities, which are greatly impacted by pollution, climate change and other environmental hazards. Through the Justice40 directive, at least 40% of benefits from government plans and programs, such as this PCAP, will go towards disadvantaged communities. Federal and state funding programs referenced in this plan, such as CRP, CMAQ and PROTECT, all follow Justice40 guidance as well. The LVPC has developed a regional equity analysis based upon Justice40 guidance, which informed the 2023 update of the *FutureLV: The Regional Plan*. This analysis helps identify areas where LRTP projects will provide especially impactful benefits, allowing for identification of transportation decarbonization projects that will benefit traditionally underserved communities.

This analysis defines low-income and disadvantaged communities (LIDAC) as any community identified as disadvantaged by the Climate and Economic Justice Screening Tool (Justice40 Disadvantaged) or any Census ID that is identified as disadvantaged by the EPA using the Environmental Justice Screening and Mapping Tool (EPA Disadvantaged).

Thirty-one of the Lehigh Valley's 144 Census IDs meet the Justice40 threshold that identifies disadvantaged communities, as well as nine Census IDs in Carbon County and eight Census IDs in Warren County. Additionally, the Lehigh Valley has 479 Census IDs that meet the EPA threshold for disadvantaged, with seven Census IDs in Carbon County and five Census IDs in Warren County meeting that threshold.



Justice40 and EPA Disadvantaged Communities

- ▭ Justice40 Disadvantaged Communities
- ▨ EPA Disadvantaged Communities
- Major Roads
- ▭ Municipal Boundaries
- ▭ County Boundaries

A person of color in the Lehigh Valley is nearly four times as likely to live in a Justice40 Disadvantaged Community compared to a person who identifies as White Alone (42.1% of all persons of color live in a disadvantaged community, compared to 11.2% of White Alone). The disparity is even greater for a person who identifies as Hispanic or Latinx, who is nearly 4.5 times more likely than a person who is White Alone (49.9% of all Hispanic or Latinx persons).

People of color and people who are Hispanic or Latinx in the Lehigh Valley are also six times more likely to have low median household incomes (22.7% of people of color and 27.5% of people who are Hispanic or Latinx, compared to 4% of people identifying as White Alone).

LVPC Equity Analysis

Equity is integral to the daily functions of the LVPC, recognizing that an equitable region is vital to the success and sustainability of the Lehigh Valley as a whole. Equity is a core element of the LVPC's mission and serves as the foundation of *FutureLV: The Regional Plan*. The LVPC and LVTS have maintained and continually updated a Lehigh Valley-wide Equity Analysis for several years that identifies existing disparities in access to opportunities and provides a platform that elevates informed discussions about equity. Since its inception, the Lehigh Valley Equity Analysis has been an accessible online tool used and referenced by many public, private and non-profit partners.

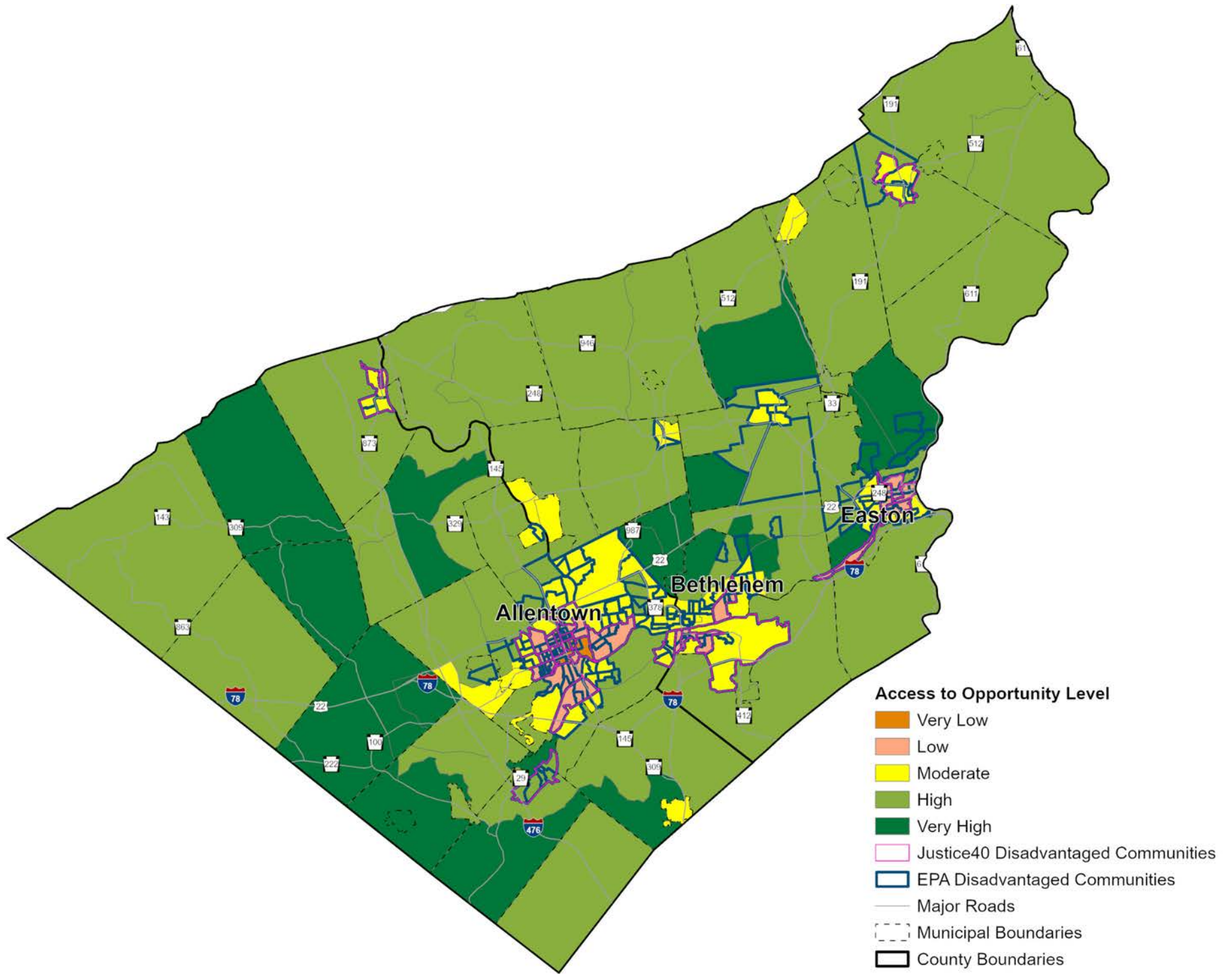
The LVPC Equity Analysis was developed using datasets obtained through the Climate and Economic Justice Screening Tool (CEJST), identifying Justice40 Disadvantaged Communities, with the addition of datapoints representing homeownership rate, zero-vehicle households and broadband access. The similarities in datasets used results in similar results between the LVPC Equity Analysis and Justice40 and EPA Disadvantaged Communities; however, where Justice40 identifies disadvantaged communities on a national level, the LVPC Equity Analysis quantifies equity between communities in the Lehigh Valley, providing a regional context in an accessible tool that supports local initiatives.

A primary function of the LVPC Equity Analysis is to identify disparities affecting disadvantaged populations that are geographically dispersed, including those with low incomes, people of color and additional populations including seniors and single parents.

The LVPC Equity Analysis is used in combination with additional map layers, such as population demographics, public infrastructure and transit service, to analyze factors with equity conditions as a primary consideration. Population demographics, such as age and race, are overlaid on the map to identify what populations have the greatest and least access to opportunity.

Justice40 Disadvantaged Communities can also be overlaid when developing and selecting projects to pay special attention to any positive and negative impacts projects will have on disadvantaged populations, and to actively include their voices in meaningful public participation processes.

**Equity in the Lehigh Valley
is achieved when race and ethnicity can no
longer be used to predict life outcomes.**



Benefits Analysis

Low-income and disadvantaged communities stand to benefit from efforts to reduce GHG emissions if historical inequities and the results of disproportionate impacts are considered to ensure that vulnerable populations are not further marginalized or burdened by environmental challenges.

The following LIDAC benefits analysis evaluates the benefits provided to low-income and disadvantaged communities by reducing transportation and air quality impacts, increasing mobility for zero-vehicle households, increasing transit ridership, commuting and walkability, and reducing impacts due to traffic proximity, as well as additional environmental benefits that mitigate climate change impacts through transportation decarbonization.

The LIDAC analysis is supported by data from the Justice40 Initiative, the EPA's Environmental Justice Screening and Mapping Tool (EJScreen), and the LVPC's Equity and Opportunity Analysis.

Justice40 is a federal initiative that seeks to address systemic inequitable historic policies and underinvestment in disadvantaged communities. US DOT defines a disadvantaged community as 'a group of individuals living in geographic proximity to one another or sharing common conditions or group experiences that experience cumulative

burden across economic, social, and environmental factors.' Through EJScreen, the EPA provides an online analysis of disadvantaged communities that includes both environmental and socioeconomic data indicators at a range of geographic levels. The EPA provides this data to be more transparent about what the EPA considers and evaluates environmental justice as well as to support a wide range of research and policy goals and assist users in making informed decisions about pursuing environmental justice. Within the MSA, 231,489 people live within a Justice40 or EPA Disadvantaged community, accounting for 27% of the population.

The LVPC has maintained and continually updated a Lehigh Valley-wide Equity and Access to Opportunity Analysis for several years that identifies existing disparities in access to opportunities and provides a platform that elevates informed discussions about equity. Since its inception, the Lehigh Valley Equity Analysis has been an accessible online tool used and referenced by many public, private and nonprofit partners. The Lehigh Valley Equity Analysis now includes 32 datasets, which support and expand on the Justice40 and EJScreen datasets.

Together, these analyses accomplish a deeper understanding of the impacts and benefits of the goals outlined in the PCAP on LIDAC populations in the MSA.

Transportation and Air Quality Impacts (PM 2.5 and Ozone)

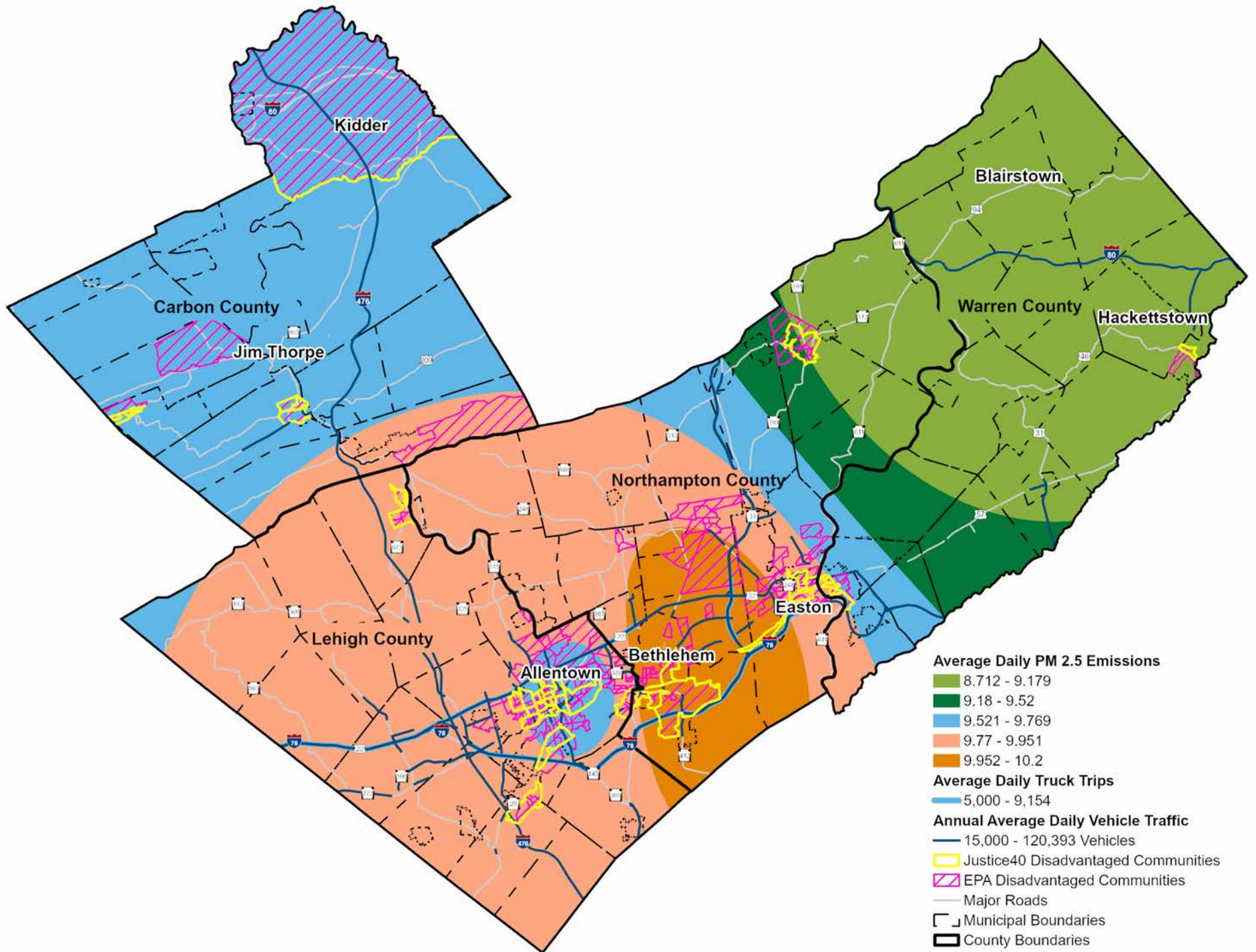
The Transportation and Mobile Sources sector is one of the Lehigh Valley's largest contributors to greenhouse gas emissions, most of which is generated by on-road gasoline vehicle travel. Air quality impacts resulting from vehicle emissions are exacerbated in low-income and disadvantaged communities, where 12% of people of color and 14.7% of those who identify as Hispanic or Latinx suffer from asthma, compared to 1.5% of people identifying as White Alone. Efforts to reduce transportation emissions and investments in alternative transportation options would help to improve adverse health impacts tied to poor air quality.

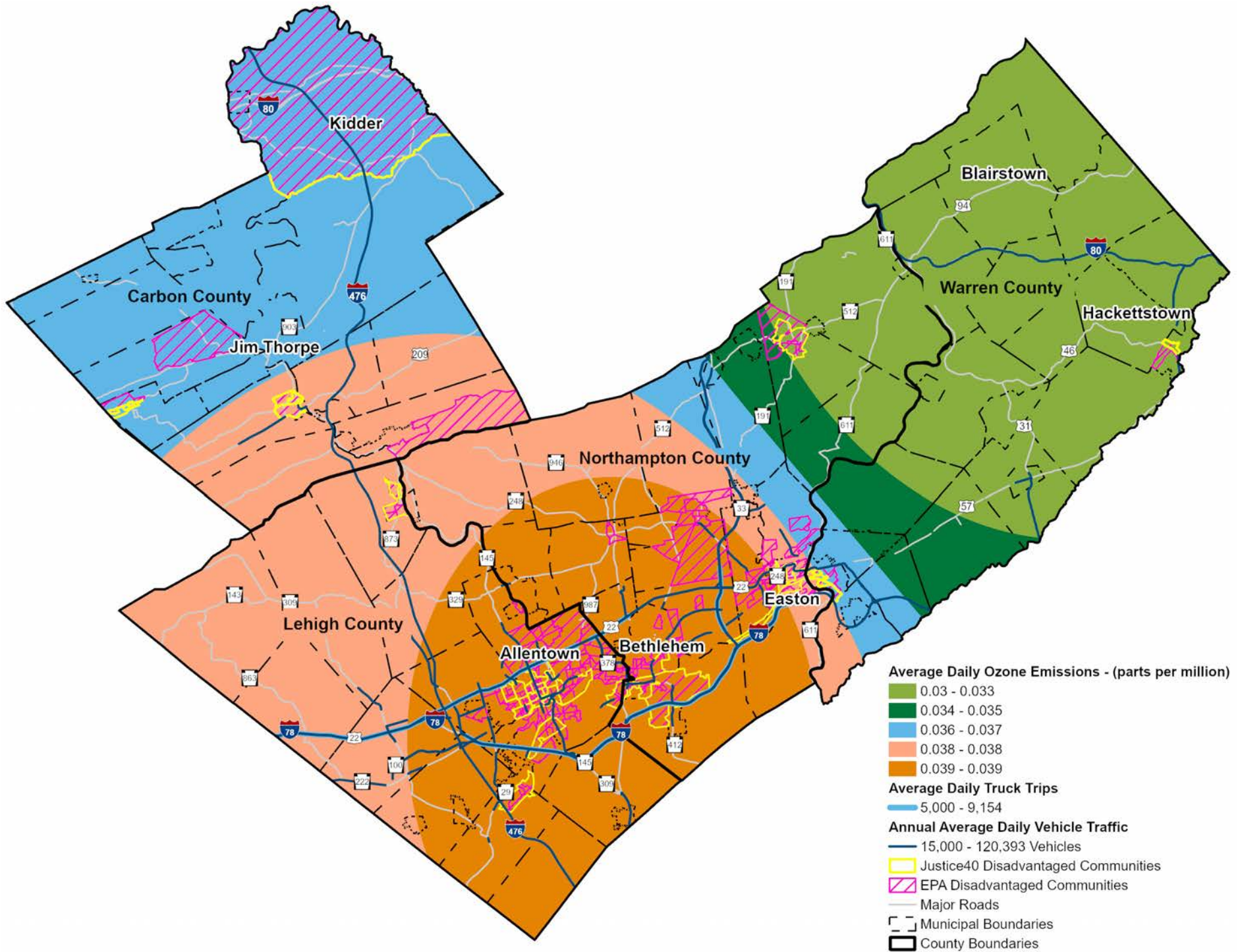
Several low-income and disadvantaged communities in the Lehigh Valley are located in areas at or above the 90th percentile of Particulate Matter 2.5 (PM 2.5) and Ozone nationwide: In Center City Allentown along North 7th Street and to the west and east, southwest of Route 22 and Cedar Crest Boulevard, east side Allentown south of Hanover Avenue and between the Lehigh River and Susquehanna Street; in the City of Bethlehem west of Stefko Boulevard and north of the Lehigh River, north of Fahy Bridge and east of Old York Road, and in Southside Bethlehem along 4th Street and Hayes Street; and in Fountain Hill Borough north of Broadway to the west.

In addition to areas of the Lehigh Valley where high rates of PM 2.5 and Ozone overlap, the City of Easton north of Lehigh Drive is between the 90th and 95th percentile nationwide for Ozone. No areas within Carbon County or Warren County are at or above the 90th percentile nationwide for PM 2.5 or Ozone.

Investing in alternative transportation options also provides additional health benefits to low-income and disadvantaged communities by increasing options for active transportation, which supports positive health outcomes. In the Lehigh Valley, 7.5% of people of color and 9.5% of people who identify as Hispanic or Latinx have diabetes, compared to 0.9% of people identifying as White Alone, and 2.9% of people of color and 3.7% of those who are Hispanic or Latinx suffer from heart disease, compared to 0.5% of people identifying as White Alone. Diabetes and heart disease are two health conditions that can be prevented through increased activity.

Air quality impacts resulting from vehicle emissions are exacerbated in low-income and disadvantaged communities.





Zero-Vehicle Households

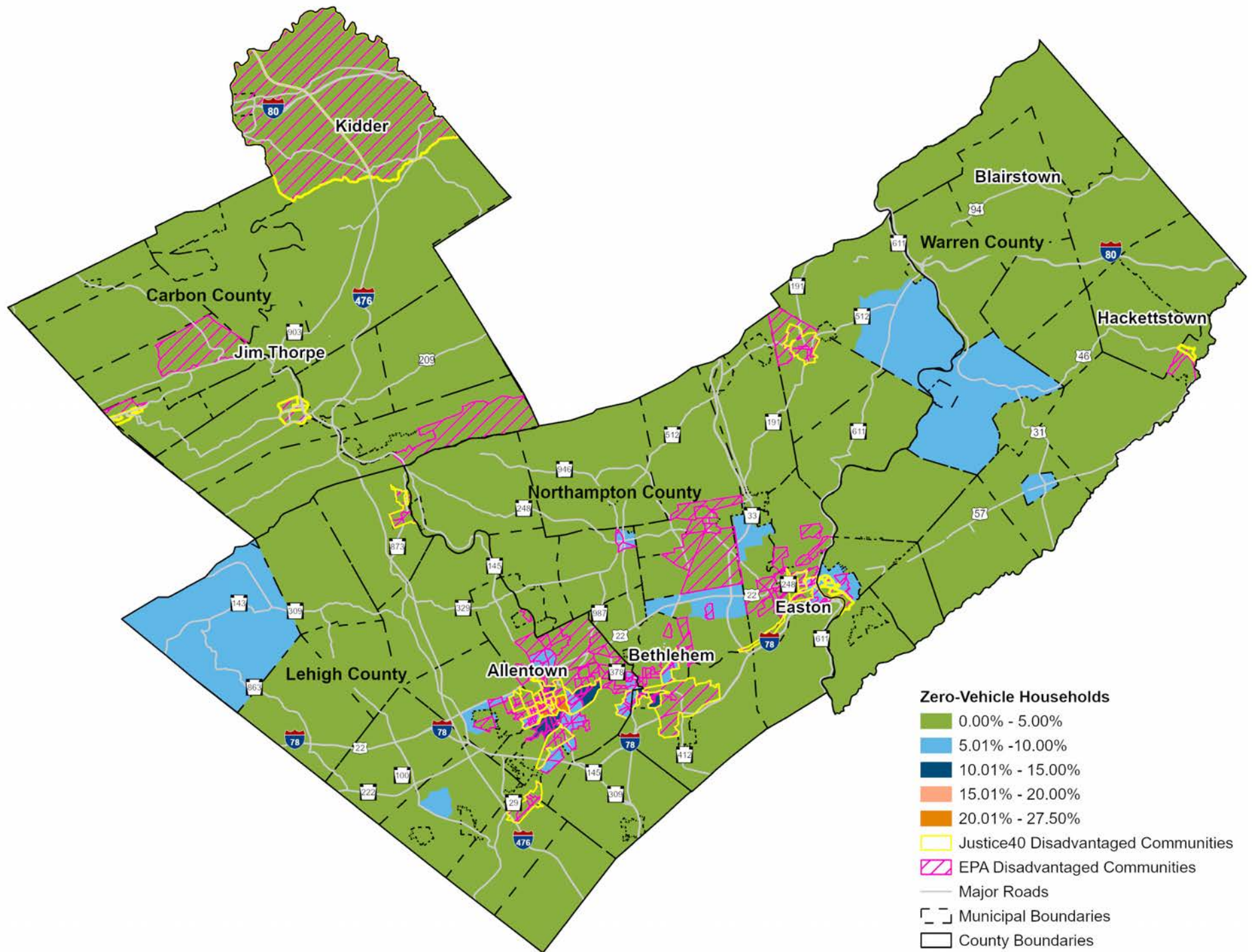
Zero-vehicle households are households that indicate they do not have any motorized vehicles. The number of zero-vehicle households is significant because the Lehigh Valley, like many regions across the country, is largely car dependent. For some, not owning a vehicle represents a lifestyle choice, while for others, the process of obtaining a vehicle is cost-prohibitive, and long-term vehicle maintenance is a substantial economic investment. Understanding which households in the region do not have access to a vehicle, and where they are located, is critical when identifying areas to direct transportation infrastructure investments. Alternative transportation infrastructure investments, such as sidewalks, bike lanes, trails and transit service, can help eliminate the need for personal vehicles and directly benefit zero-vehicle households.

In a car-centric society, not having access to a vehicle can limit access to critical needs, including employment, educational opportunities, healthcare, daycare and grocery stores. It can also substantially increase the burden of time required to move between locations. About 7.4% of Lehigh Valley households do not have a vehicle available, the equivalent of 19,383 households. Those households are primarily concentrated in core urban areas where there are more mode options available (Allentown, Bethlehem and Easton cities), but zero-

vehicle households also expand beyond city boundaries into suburban and rural townships and boroughs where alternative modes, such as transit, are more limited, if available at all.

Disparities in mode choice are also present for geographically dispersed populations. In the Lehigh Valley, people of color and the Hispanic or Latinx population are much more likely to live in areas where a high concentration of households do not have access to a vehicle: 28.8% of people of color and 34.7% of people identifying as Hispanic or Latinx, compared to 3.7% of people identifying as White Alone. Additionally, a person who is Black, Indigenous or a person of color is nearly three times more likely to commute to work via alternative transportation modes, including public transportation, walking, biking, rideshare or some other means (9.1% people of color compared to 3.6% of White, Non-Hispanic). Benefits to low-income and disadvantaged communities can be quantified by tracking the increase in number of locations accessible via alternative transportation modes available in LIDAC neighborhoods and areas with zero-vehicle households.

About 7.4% of Lehigh Valley households do not have a vehicle available, the equivalent of 19,383 households.

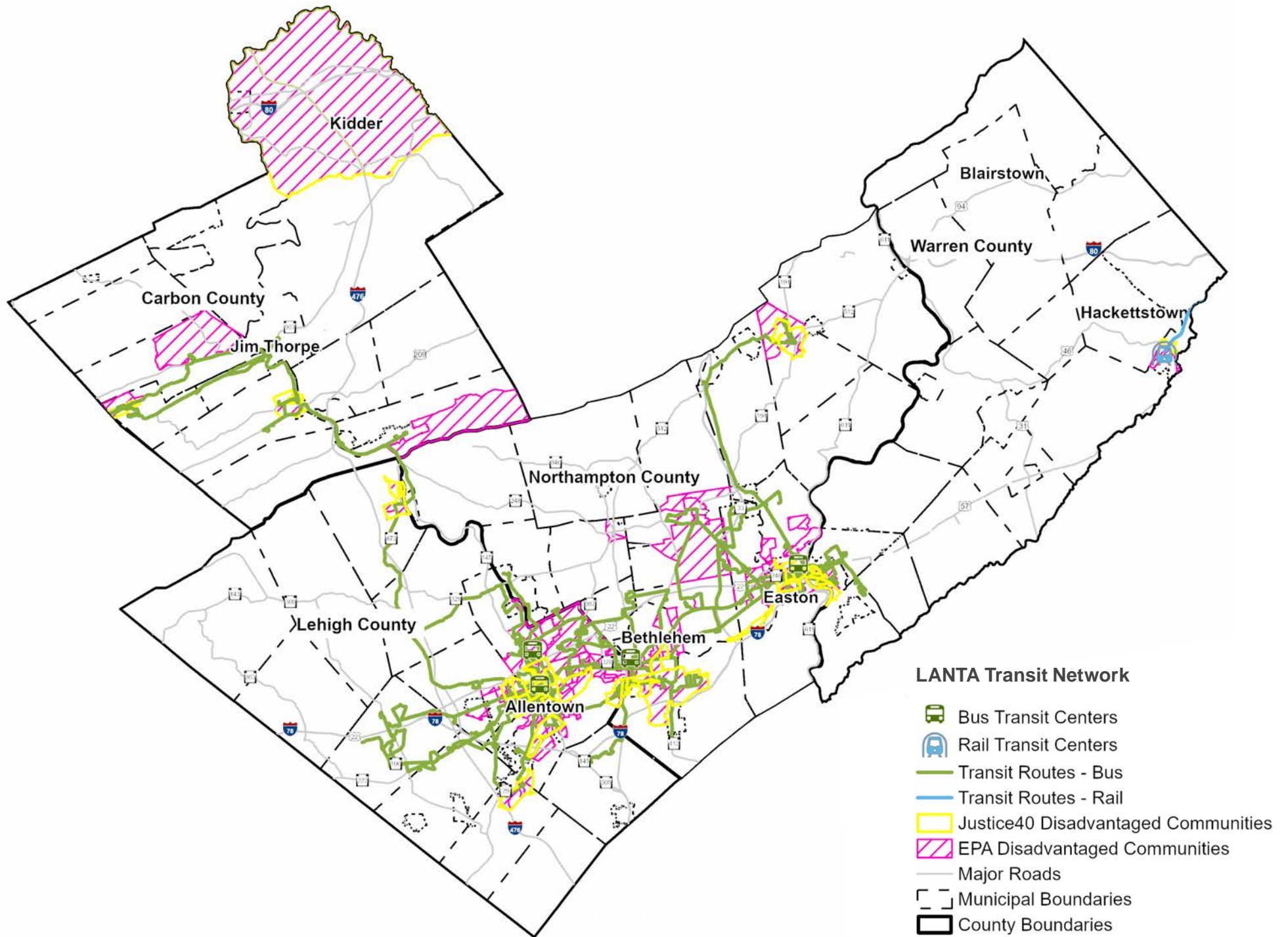


Transit Ridership and Commuting

The Lehigh and Northampton Transportation Authority (LANTA) provides transit service within nearly all the Lehigh Valley's identified low-income and disadvantaged communities. The southwestern portion of Bath Borough is the most notable area of the region, with identified low-income and disadvantaged communities, that does not have transit service available, and no service is provided in the vicinity. Areas of Forks Township, just north of the City of Easton, are not served directly by transit but have transit service available nearby along Sullivan Trail. In Carbon County, low-income and disadvantaged communities northwest of Jim Thorpe and east of Palmerton also have transit service available nearby but are not served directly by transit. In Warren County, low-income and disadvantaged communities in Phillipsburg and Hackettstown are both served directly by transit.

It is critical for transit service to not only be available to low-income and disadvantaged communities, but also provide access to key destinations, such as educational institutions, healthcare and job centers with frequent, consistent and predictable service throughout the day and night. Benefits specific to low-income and disadvantaged communities can be quantified by tracking the increase in transit ridership, the increase in number of locations accessible via transit from LIDAC neighborhoods, the decrease in length of time for transit trips between LIDAC neighborhoods and key destinations, and the increase in frequency of service availability.

About 7.4% of Lehigh Valley households do not have a vehicle available, the equivalent of 19,383 households.



Walkability

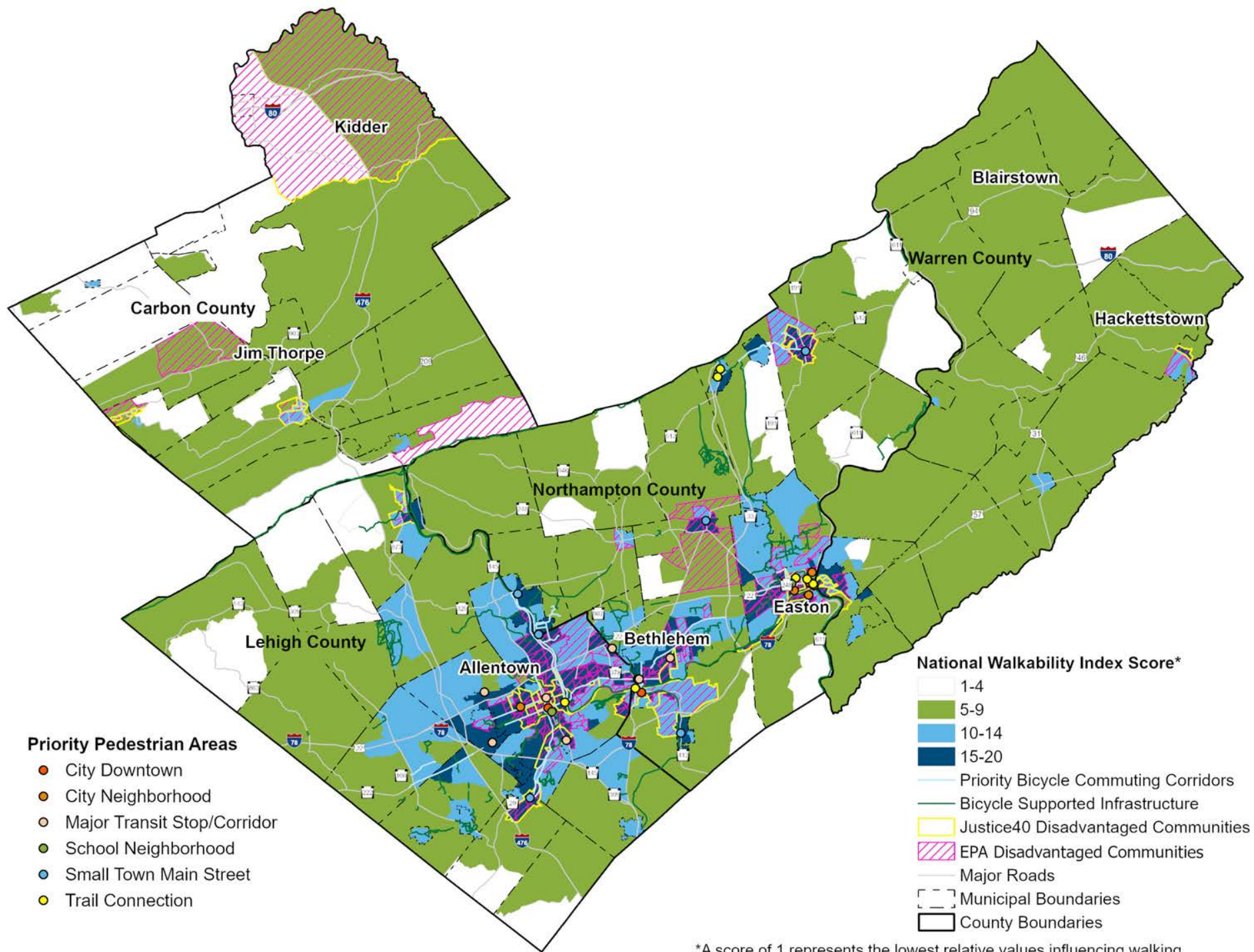
Policies to increase alternative transportation and walkability would particularly benefit the Lehigh Valley's low-income and disadvantaged communities that are located in areas with some of the region's lowest National Walkability Index scores:

- ▶ Lower Nazareth to the east and south of Nazareth Borough
- ▶ Forks Township east of Sullivan Trail
- ▶ Southern Bushkill Township adjacent to Nazareth Borough
- ▶ Northwest of Jim Thorpe and east of Palmerton, in Carbon County.

There are several other areas of the region where alternative transportation infrastructure can further improve walkability to serve low-income and disadvantaged communities (Score of 10-14):

- ▶ Northern and western areas of Slatington Borough
- ▶ Southwestern Bath Borough
- ▶ Northern Nazareth Borough
- ▶ Southern Forks Township adjacent to the City of Easton; areas of northern and southeastern Easton, West Easton Borough and Wilson Borough
- ▶ Hanover Township, Lehigh County
- ▶ Areas in the cities of Bethlehem and Allentown
- ▶ Phillipsburg and Hackettstown in Warren County

Benefits specific to low-income and disadvantaged communities can be quantified by tracking the increase in the National Walkability Index Score for LIDAC neighborhoods and areas frequented by low-income and disadvantaged communities.



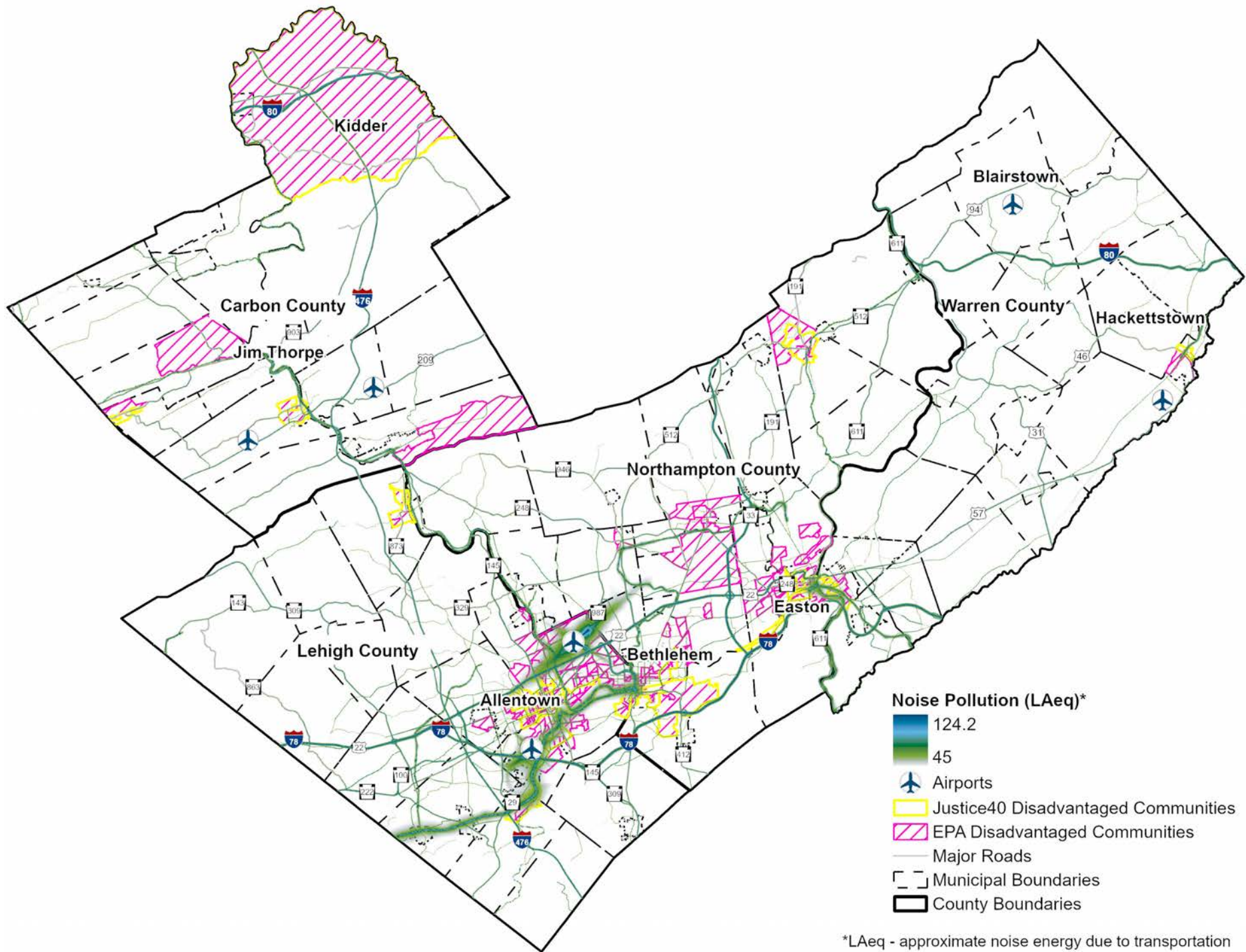
*A score of 1 represents the lowest relative values influencing walking

Traffic Proximity

Areas with high rates of traffic proximity should be targeted for efforts to reduce traffic. Several low-income and disadvantaged communities in the Lehigh Valley are located in areas at or above the 90th percentile of traffic proximity: In the City of Allentown, Center City, East Allentown, north of Susquehanna Street and southeast of Route 22 and Cedar Crest Boulevard; in Whitehall Township southeast of Route 22 and MacArthur Road; in the City of Bethlehem, northwest and southwest of Route 22 and Schoenersville Road, Southside Bethlehem, along Bethlehem's Main Street and east of Stefko Boulevard; southwest Bath Borough; in the City of Easton along Larry Holmes Drive and Lehigh Drive and along Northampton Street at Wood Avenue; in Warren County, southern and southwestern Hackettstown and the eastern and southern areas of Phillipsburg. No areas of Carbon County are in the 90th percentile or above for traffic proximity.

The following map indicates the level of noise pollution generated by traffic in relation to low-income and disadvantaged communities.

It is of note that high traffic proximity is located at the four Route 22 interchanges centrally located in the Lehigh Valley: the 15th Street interchange, Cedar Crest interchange, 7th Street/MacArthur Road interchange and Route 378 interchange. Benefits to low-income and disadvantaged communities can be quantified by tracing the reduction in traffic proximity within and near LIDAC neighborhoods.



Climate Mitigation Benefits

Transportation emissions contribute to climate change and indirectly contribute to other environmental risks resulting from increasing global temperatures and extreme weather events. Reducing transportation emissions supports the reduction of other climate change impacts on low-income and disadvantaged communities, such as the risk of flooding and associated property loss or damage, and heat island effects, where areas with a high rate of impervious cover and a low rate of green space experience hotter temperatures than surrounding areas.

Low-income and disadvantaged communities are particularly vulnerable to:

Extreme weather events

- ▶ Low-income and disadvantaged communities located in proximity to streams and water bodies are prone to flood hazard, especially in the event of extreme rainfall.
- ▶ Low-income and disadvantaged communities often lack financial means or social capital to address property damage in the event of extreme weather events and are at greater risk of displacement.

Extreme heat and urban heat island effects

- ▶ Many low-income and disadvantaged populations are concentrated in urban areas with a high proportion of grayscape.

The LVPC and LVTS have identified the following climate mitigation benefits that will reduce the overall risk of adverse climate impacts on low-income and disadvantaged communities (LIDAC):

Equitable Access to Public Transportation

Investing in affordable and efficient public transportation options benefits low-income individuals who may rely on public transit for their daily commute. Well-planned public transportation systems can reduce traffic congestion, lower emissions and improve air quality in marginalized communities.

Direct Benefit: Infrastructure investments in LIDAC neighborhoods.

Indirect Benefits: External infrastructure investments supporting LIDAC use in other areas and connecting LIDAC neighborhoods to other places.

Example: Well-designed bus shelters in shopping centers that may not be within LIDAC neighborhoods but are frequented by LIDAC at high employment centers.

Access to Active (Alternative) Transportation

Developing infrastructure for active transportation opportunities, such as trails and sidewalks, provides travel options that are lower cost and health-supportive for low-income individuals. Investing in active transportation helps connect communities to employment opportunities and educational and cultural resources and can serve as an extension of the region's transit system.

Direct Benefit: Infrastructure investments in LIDAC neighborhoods.

Indirect Benefit: External infrastructure investments connecting LIDAC neighborhoods to other places.

Public Health Benefits

Greenhouse gas reduction goals often lead to improved air and water quality. This has direct public health benefits, as cleaner environments can reduce the incidence of respiratory diseases and other health issues that disproportionately affect low-income and disadvantaged populations.

Direct Benefit: Cleaner air and water improves health outcomes and reduces the rate of adverse health conditions (asthma, diabetes, heart disease).

Green Job Creation

Implementing renewable energy projects, energy efficiency initiatives and sustainable infrastructure can generate employment opportunities. By focusing on training and hiring from within local communities, especially in areas with lower incomes and higher unemployment rates, these initiatives can directly benefit low-income populations.

Direct Benefit: Providing increased job opportunities specifically for LIDAC attainability.

Affordable and Clean Energy Access

Policies that promote the use of clean and renewable energy sources can help reduce energy costs for households. Targeted programs, such as subsidies and incentives, can make clean energy technologies more affordable and accessible to low-income communities, improving energy efficiency and reducing reliance on fossil fuels.

Direct Benefit: Reduced energy costs and reduced barriers to obtaining green energy.

Climate Resilient Infrastructure

Designing and implementing climate-resilient infrastructure projects, such as flood barriers, green spaces and improved water management, can enhance the resilience of vulnerable communities to the impacts of climate change. Measures that prioritize areas susceptible to climate-related hazards with populations historically facing environmental injustices will reduce disparate impacts resulting from extreme weather events.

Direct Benefit: Improved climate resiliency for LIDAC properties, preventing property damage or loss during extreme weather events.

Indirect Benefit: Investments outside of LIDAC neighborhoods targeting possible flood sources can prevent property damage or loss.

Equitable Access to Climate Information

Ensuring that communities have access to timely and relevant information about climate change impacts and adaptation strategies is crucial. This can empower residents to make informed decisions and participate in local climate planning efforts.

Direct Benefit: Providing necessary information that supports critical decision making.

Inclusive Decision-Making Processes

Actively involving representatives from low-income communities and communities of color in decision-making processes related to climate policies ensures that diverse perspectives are considered, and solutions are tailored to the specific needs of these communities.

Direct Benefit: LIDAC participation supports diverse perspectives and specific solutions to community needs.



Review of Authority to Implement Reduction Measures

In the context of transportation decarbonization, a comprehensive review of the authority to implement proposed greenhouse gas reduction goals is crucial for effective action.

The legal and regulatory framework provides the basis for implementing transportation decarbonization strategies. This includes laws and regulations related to vehicle emissions, fuel standards and transportation funding. Ensuring that these legal frameworks are robust and forward-looking is essential for enabling effective decarbonization efforts. This section provides a general overview of various organizations and agencies with implementation authority related to goals included in this plan. Specific references are included with each goal described in Greenhouse Gas Reduction Goals.

The organizations listed below have specific legal authority via federal, state or municipal code to set policy, allocate funding, regulate land use and/or enforce regulations. Effective implementation of these strategies is essential for transitioning to a more sustainable transportation system, which is a key component in the fight against climate change.

Implementing transportation decarbonization strategies involves navigating various challenges, including coordinating among different levels of government, securing adequate funding and overcoming political and institutional barriers. However, there are significant opportunities to leverage new technologies, foster public-private partnerships and engage communities in the transition to sustainable transportation.

A thorough review of the authority to implement transportation decarbonization strategies reveals a complex web of stakeholders, each with unique roles and responsibilities. Effective collaboration and coordination among these stakeholders are crucial for achieving the shared goal of a sustainable and low-carbon transportation future. By understanding the specific powers and capacities of each entity, strategies can be more effectively designed and implemented, paving the way for a more environmentally friendly and sustainable transportation system.

“There are significant opportunities to leverage new technologies, foster public-private partnerships and engage communities in the transition to sustainable transportation.”

Federal Government

At the federal level, agencies such as the USDOT and EPA possess significant authority to set nationwide policies and regulations that guide transportation decarbonization. This includes setting emission standards for vehicles, providing funding for sustainable transportation projects, and supporting research and development in green technologies. The Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA) also play crucial roles in funding and overseeing transportation projects that contribute to decarbonization.

State Government

State governments, in this case Pennsylvania and New Jersey, through agencies such as environmental agencies and state DOTs, have the authority to implement state-level policies and programs that align with federal guidelines. This includes developing state infrastructure plans, regulating vehicle emissions and providing incentives for EV adoption. States can also establish partnerships with private companies and local governments to accelerate the transition to sustainable transportation.

Local Government

Local governments, including municipal and county governments and authorities, have varying control over local transportation planning and infrastructure. Local governments are enabled to regulate land use via zoning and subdivision ordinances that encourage sustainable urban development patterns and promote pedestrian and bicycle-friendly policies. Municipalities, counties and transit authorities can determine levels of investment in transit infrastructure, alternative fueled vehicles and systems. Local governments also play a key role in facilitating community engagement and ensuring that decarbonization initiatives meet the specific needs of their communities.

Metropolitan Planning Organizations (MPOs)

MPOs, including LVTS, NEPA and NJTPA, play a pivotal role in regional transportation planning. They are responsible for developing long-range transportation plans and short-term improvement programs, such as the Transportation Improvement Program, that integrate sustainability and decarbonization objectives. MPOs also coordinate funding and project implementation among various stakeholders, ensuring alignment with regional and national transportation goals.

Private Sector

Private sector entities, particularly companies involved in the automotive, public transit and energy industries, are essential in driving innovation and investment in decarbonization technologies. Private companies can develop and commercialize clean transportation technologies, such as electric vehicles and hydrogen fuel cells. They can also partner with government entities to deploy these technologies and operate sustainable transportation services.



Other Funding Sources

The success of transportation decarbonization initiatives in the region hinges significantly on the adept management of funding and resource allocation.

This process involves not just securing adequate funding but also ensuring that these resources are directed efficiently towards projects that offer the highest impact in terms of carbon reduction, sustainability and equity.

This section includes a general overview of funding sources for transportation decarbonization efforts. Specific funding sources are included with each goal described in Greenhouse Gas Reduction Goals.

Securing Funding

A key strategy in funding transportation decarbonization projects involves tapping into a variety of sources.

- ▶ Grants, whether federal, state or from non-governmental organizations, are a primary source. These grants often target specific areas, such as emission reduction, sustainable transportation or innovation in transit systems.
- ▶ Public-private partnerships (PPPs) leverage the strengths of both sectors — the efficiency and innovation of the private sector combined with the public sector’s regulatory support and broad perspective. PPPs can be particularly effective in large-scale infrastructure projects or in areas where new technology is being implemented.
- ▶ Governmental budgets, both at the state and local levels, are also crucial. Allocating funds from these budgets requires advocacy and lobbying to ensure transportation decarbonization is prioritized within the broader context of government spending.

Allocating Resources Efficiently and Equitably

- ▶ Efficient allocation of resources necessitates a strategic approach. Priority should be given to projects that promise the most significant impact in terms of carbon reduction. This involves a thorough analysis of potential projects based on criteria such as emission reduction potential, cost-effectiveness, feasibility and long-term sustainability.
- ▶ Resource allocation priorities must include evaluation of community impact to ensure that benefits are available and accessible to low-income and disadvantaged communities (LIDAC). It also involves a balancing act between investing in proven technologies and innovative solutions. While established methods provide a certain level of security in terms of outcomes, innovation is crucial for long-term advancements in decarbonization.

Monitoring and Evaluation

- ▶ Equally important is the establishment of a robust monitoring and evaluation system. This ensures that the allocated resources are being used effectively and that the projects are on track to meet their decarbonization goals.

Stakeholder Involvement

- ▶ Engaging stakeholders in the funding and resource allocation process also adds value. It ensures transparency and builds trust among the public and private entities involved. Stakeholder feedback can also provide insights into how resources can be best utilized to meet the community's needs.

Transportation Decarbonization Funding Opportunities

Funding Name	Organization	Description
Climate Pollution Reduction Grant (CPRG) Implementation Grants	US Environmental Protection Agency	The CPRG program provides discretionary funding for implementable and ambitious projects that will achieve substantial greenhouse gas and hazardous air pollutant emission reductions and achieve substantial community benefits.
Transit Planning 4 All Grant (T4All)	Community Transportation Association of America	T4All is an inclusive and coordinated transportation planning project that has funded a series of pilot projects across the nation, each seeking to increase inclusion in transportation planning and services for people with disabilities and older adults.
National Volunteer Transportation Center Grant	Community Transportation Association of America	The purpose of the Center is to promote and support the concept and practice of volunteer transportation, which includes volunteer driver programs, shared vehicle utilization and ride sharing initiatives.
National Center for Mobility Management Grant	Community Transportation Association of America	The Center's primary activities support mobility management professionals, Federal Transit Administration (FTA) grantees and partners in adopting proven, sustainable and replicable strategies that achieve its mission.
The National Center for Applied Transit Technology Grant	Community Transportation Association of America	The grant provides technical assistance regarding emerging transportation technologies for states and localities across the US. The Center will develop learning and planning resources for rural, small-urban and tribal transportation providers and communities, as well as provide community and state-specific technical assistance.

Funding Name	Organization	Description
Alternative Fuels Incentive Grants (AFIG)	Pennsylvania Department of Environmental Protection	AFIG has approximately \$5 million in funding available annually to school districts, municipalities, non-profit organizations and businesses in Pennsylvania that want to transition to cleaner fuel transportation. Supported alternative fuels include electricity, compressed natural gas, liquefied natural gas, propane, hydrogen, hythane, biodiesel, ethanol, methanol and other advanced biofuels.
DCNR Trail Grants	Pennsylvania Department of Conservation and Natural Resources (DCNR)	DCNR's Bureau of Recreation and Conservation provides grants to support the enhancement and expansion of non-motorized and motorized trails.
Surface Transportation Block Grant Program (STP) and Surface Transportation – Urban (STU) (formerly Transportation Alternatives Program (TAP) and Transportation Alternatives – Urban (ATU))	US Department of Transportation	The Surface Transportation Program provides flexible funding for states and localities for projects to preserve and improve the conditions and performance on any federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals.
Transportation Alternatives Set-Aside Program (TASA)	Pennsylvania Department of Transportation	TASA provides funding for transportation alternatives, including pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation, community improvement activities, environmental mitigation, trails that serve a transportation purpose and safe routes to school projects.

Funding Name	Organization	Description
Infrastructure and Facilities Improvement Program (IFIP)	Pennsylvania Department of Revenue	The IFIP provides multi-year grants that will be used to service debt that was incurred to pay the costs of certain infrastructure and facilities improvement projects that enhance the economic development of Pennsylvania.
Greenways, Trails and Recreation Programs (GTRP)	Pennsylvania Department of Community and Economic Development	Since 2012, GTRP established the Marcellus Legacy Fund that allocates funds to the Commonwealth Financing Authority for planning, acquisition, development, rehabilitation and repair of greenways, recreational trails, open space, parks and beautification projects.
Congestion Mitigation and Air Quality Program (CMAQ)	US Department of Transportation	Introduced in 1991, CMAQ funds transportation projects that reduce vehicle idling and improve air quality without adding new highway capacity.
Advanced Transportation Technology & Innovation (ATTAIN)	US Department of Transportation	ATTAIN is a grant by the USDOT that deploys advanced technologies to address safety, mobility, sustainability, economic vitality and air quality through advanced technologies that maximize efficiencies.
National Highway Performance Program (NHPP)	US Department of Transportation	NHPP is funding to support the National Highway System. It can be used for the construction of bridges, tunnels, highways, bicycle and pedestrian facilities, and ITS Intelligent Transportation Systems (ITS) improvements.
Carbon Reduction Program (CRP)	US Department of Transportation	CRP funds projects designed to reduce transportation emissions. These funds can be “flexed” to fund transit projects.
National Electric Vehicle Infrastructure (NEVI) Program	US Department of Transportation	NEVI funds projects for fast-charging stations along identified national Alternative Fuel Corridors (AFCs). After these corridors are sufficiently built out, the program will then focus on projects on any publicly accessible road.

Funding Name	Organization	Description
Lehigh Valley Greenways (LVG) Mini Grant Program	Lehigh Valley Greenways	LVG mini grants provide funding to plan for and/or implement projects that protect and promote the natural resources of the Lehigh Valley, such as projects that improve bicycle/pedestrian connections and enhance trail access.
Clean School Bus (CSB) Program	US Environmental Protection Agency	The CSB Program provides rebates, grant funding, technical assistance, workforce development and educational materials to help replace existing school buses with zero-emission and low-emission models.
Promoting Resilient Operations for Transformative, Efficient, and Cost Saving Transportation (PROTECT) Discretionary Grant Program	US Department of Transportation	PROTECT provides funding for planning and implementation of projects that help make surface transportation more resilient to natural hazards, including climate change, sea level rise, flooding, extreme weather events and other natural disasters.



Further Engagement + Coordination

The LVPC will build and expand upon its technical GHG emissions data and public engagement approaches included in the PCAP to develop its Comprehensive Climate Action Plan (CCAP). The LVPC will continue to build upon initial outreach conducted as part of the PCAP to entities within Carbon County, Pennsylvania and Warren County, New Jersey to seek information and insight on the development and analysis of GHG emission reduction goals across all sectors in the MSA region.

Enhancing Public Engagement

Public engagement is a vital component for planning and developing the CCAP. Every person, regardless of race, religious creed, ethnicity, gender, sexuality, disability status or socio-economic status should have the opportunity to participate in the climate action planning process. Providing full disclosure of plans and programs during the development phase involves the general public and ensures that the plans and programs are influenced by public feedback. The access to these documents and plans during and after the adoption process is critical to facilitate public comment.

“Public engagement is a vital component for planning and developing the CCAP.”

For the CCAP, the LVPC will continue to follow and strengthen the Public Participation Plan practices of the LVPC/LVTS, including but not limited to:

1. All workshop meetings are open to the public.
2. All workshops are advertised in a local newspaper of general circulation covering the study area at least five business days before the meeting. All workshops are also advertised on social media and the LVPC website.
3. Physical copies of plans and programs available for review must be available for the duration of the public comment period at the following locations:
 - a. Allentown Public Library
 - b. Bethlehem Area Public Library
 - c. Easton Area Public Library
 - d. LANTA Office
 - e. LVPC Office
 - f. PennDOT District 5-0 Office
4. All physical copies of documents available for public review must include a public notice to summarize the document and provide details about the public comment period for the document.
5. When plans and program documents become publicly accessible, memorandums are sent to municipalities, tribal contacts, community-based organizations and individuals who have requested notification. These memorandums include information on where the documents can be reviewed, both physically and digitally, when and where public meeting(s) will be held and how comments can be made.
6. Staff strives to maintain relationships with partners and stakeholders and members of the public to facilitate meaningful engagement between the MPO and the community.
7. Public notices are sent to various media outlets to further promote public participation in the planning process. Printed media (general newspapers, community newspapers, magazines) audiovisual media (television news, radio news, television community bulletin boards), website (LVPC website), mass email marketing tools and social media (Facebook, X, Instagram, LinkedIn) should be utilized. When applicable, Spanish language media outlets must be included in this notice.

8. The LVPC will convert plans and programs into alternative formats, such as large font or Braille, when requested. Web-based materials will also include accessibility features, including captions and alternative text, when available.
9. Visioning techniques, such as maps and slideshows, are utilized to share information regarding plans and programs with the public.
10. In-person meetings are held in locations accessible by public transportation and in a facility that can accommodate wheelchair users.
11. Agendas and other meeting materials are available to participants as printed handouts and/or projected images. These materials will also be posted to the LVPC website.
12. For virtual meetings, a live meeting link will be created and shared publicly for the meeting. At the time of adoption, the LVPC uses Microsoft Teams as a virtual meeting platform.
13. Participants are notified of the closed-captioning function of the virtual meeting platform.
14. Agendas and other meeting materials are shared through screen-share and linked in the chat function of the virtual meeting platform. These materials are posted to the LVPC website.

The LVPC will continue to utilize the Lehigh Valley Equity Analysis to determine areas of low-income and disadvantaged populations. It is expected that WorkshopLV meetings will be held in these communities. In addition, the LVPC will leverage its relationship with WDIY National Public Radio and monthly Plan Lehigh Valley radio program and Morning Call newspaper Business Cycle column to engage the community broadly. The LVPC intends to work with the Spanish-language radio station MEGA 101.7FM, the Chamber of Commerce's African American, Hispanic and LGBTQ + Committees, Lehigh Valley Center for Independent Living, Lehigh Valley Conference of Churches, as well as the United Way's Age-Friendly Lehigh Valley Committee to engage often underrepresented groups in the development and implementation of the CCAP. The all-government General Assembly infrastructure will help support the dissemination of information and invitations to various in-person and online engagements to the broader public. The General Assembly is an excellent avenue to reach out to rural and isolated individuals and groups that would not otherwise be reachable. Utilizing the municipal and state legislative offices connected to this engagement platform is critical outside of the region's urbanized areas.

It is of note that the LVPC's equity commitment is extending to its offices as the LVPC will be relocating to a Justice40 data-identified neighborhood in Allentown in March 2024. Also, the LVPC specifically employs a Regional Planner for Community Engagement, who has training and experience working in underserved communities. Materials and support are available for visually and auditorily impaired persons and in alternate languages as part of the LVPC's adopted Public Participation Plan. All engagement is required by the adopted policies of the LVPC to occur with equity and health as foundations and early information gathering, later policy and implementation development will be required to meet these standards. Low-income and disadvantaged communities' engagement and needs will be included from the beginning of the effort and throughout implementation.

 **The General Assembly is an excellent avenue to reach out to rural and isolated individuals.** 

CCAP Interagency and Intergovernmental Coordination

As previously noted, the LVPC is a representative government for the 62 municipalities and two counties comprising the Lehigh Valley. The LVPC is responsible for all coordination and collaborations on environmental, housing, economic, land use, farmland and open space preservation, parks and recreation, public facilities and utilities, water, sewer and transportation issues for the bi-county area under a series of state and federal statutes. As such, the LVPC and its sister entity, the Lehigh Valley Transportation Study (LVTs), bring together governmental entities, authorities, boards, commissions, non-profits and for-profit entities in the interests of the public health, safety and general welfare of the Lehigh Valley.

Current relationships and partnerships with the Workforce Board Lehigh Valley, Greater Lehigh Valley Chamber of Commerce Energy and Environment Committee, Wildlands Conservancy, Pennsylvania Department of Environmental Protection, Pennsylvania Department of Transportation, United Way of the Greater Lehigh Valley, Nurture Nature Center, City Mayor's Coalition, Municipal Environmental Advisory Council Network, Lehigh Valley Partnership and many others will support the development and implementation of the CCAP. It is of note that the United Way will be a key partner in the engagement of equity communities. This work will happen through standing committees within partner organizations and through the WorkshopLV public

engagement working groups. All materials will be housed on the website of the LVPC, a public website; hard copy and translation services will be available upon request, at a minimum as well.

Central to the CCAP will be the identification and prioritization of quantifiable GHG reduction goals and associated emission reduction targets. A workforce planning analysis and benefits analysis, with prioritization of low-income and disadvantaged communities, will be completed. These tasks will support the development of the Comprehensive Climate Action Plan.

Once drafted, the plan will be vetted and refined through the public participation process. An implementation structure will be developed that will identify resources, including the intersection of funding sources, to support long-term, committed climate action.

Following completion of the CCAP in summer 2025, the LVPC will begin monitoring progress on the plan strategies, which is the third phase of the EPA CPRG program.

Overall, it is the intent of this effort to support the creation of a 'green ribbon team' from among the various WorkshopLV, LVPC, General Assembly and LVTs participants and to develop a permanent infrastructure to further climate action past the CPRG effort.



Conclusion

Once the priority climate action plan is completed, the implementation grant applications for the \$4.6 billion pool of funding will be due April 1, 2024. LVPC will then work on the regional comprehensive climate action plan (CCAP), covering all emission sectors.

The regionwide comprehensive climate action plan will be adopted on or before June 2025. This plan will include a monitoring period for policy measures, which will last through 2027. Concurrent with this plan is the updated long range transportation plan, which allocates funding, from now through 2050, for specific transportation projects that will reduce emissions. The opportunity to coordinate climate action through various related programs like these is unprecedented, and jump starts progress towards a low carbon future.

Potential GHG emission reductions resulting from the goals outlined in this plan are estimated at over 321,000 metric tons of CO₂e annually by 2050, a reduction from 2021 transportation sector emissions by nearly 12%. These goals, coupled with improvements in clean fuel technologies and other climate sector emission reduction goals will benefit our communities, our environment, and our economy. Considering that the Lehigh Valley’s population is projected to grow by 14%, job growth by 19% and Vehicle Miles Traveled by 23% during this time, the actual reduction in emissions is much more significant as these occur even with continued regional population and job growth.

The Lehigh Valley and its broader region continue to attract new businesses, families, and tourists due to its centrally convenient location between two major metropolitan areas, affordability, diverse institutions, and unique and abundant natural resources. With this popularity comes responsibility to manage growth and protect, preserve, and steward its environmental heritage for its current and future population. The PCAP is the first step in a longer-term commitment for the region to ensure a healthy, robust, and sustainable future.

321,000 MTCO₂e
Potential Greenhouse Gas Reductions,
resulting from the goals outlined in this plan

Climate Pollution Reduction Grant (CPRG) Timeline



List of Acronyms

AFV – Alternative Fuel Vehicle

CCAP – Comprehensive Climate Action Plan

CH₄ – Methane

CMAQ – Congestion Mitigation and Air Quality

CO₂ – Carbon Dioxide

CO₂e – Carbon Dioxide Equivalent

CPRG – Climate Pollution Reduction Grant

CRP – Carbon Reduction Plan

DOT – Department of Transportation

EPA – US Environmental Protection Agency

EV – Electric Vehicle

GHG – Greenhouse Gas

LANTA – Lehigh and Northampton Transportation Authority

LCAP – Local Climate Action Program

LIDAC – Low-Income and Disadvantaged Communities

LRTP – Long-Range Transportation Plan

LVPC – Lehigh Valley Planning Commission

LVTS – Lehigh Valley Transportation Study

MPO – Metropolitan Planning Organization

MSA – Metropolitan Statistical Area

N₂O – Nitrous Oxide

NEPA -Northeast Pennsylvania Alliance

NJTPA – North Jersey Transportation Planning Authority

PCAP – Priority Climate Action Plan

PA DCED – Pennsylvania Department of Community and Economic Development

PA DCNR – Pennsylvania Department of Conservation and Natural Resources

PA DEP – Pennsylvania Department of Environmental Protection

PennDOT – Pennsylvania Department of Transportation

PM 2.5 – Particulate Matter 2.5

PROTECT – Promoting Resilient Operations for Transformative, Efficient and Cost-Saving Transportation

TASA – Transportation Alternatives Set-Aside

TIP – Transportation Improvement Program

TSMO – Transportation Systems Management and Operations

US DOT – US Department of Transportation

VMT – Vehicle Miles Traveled

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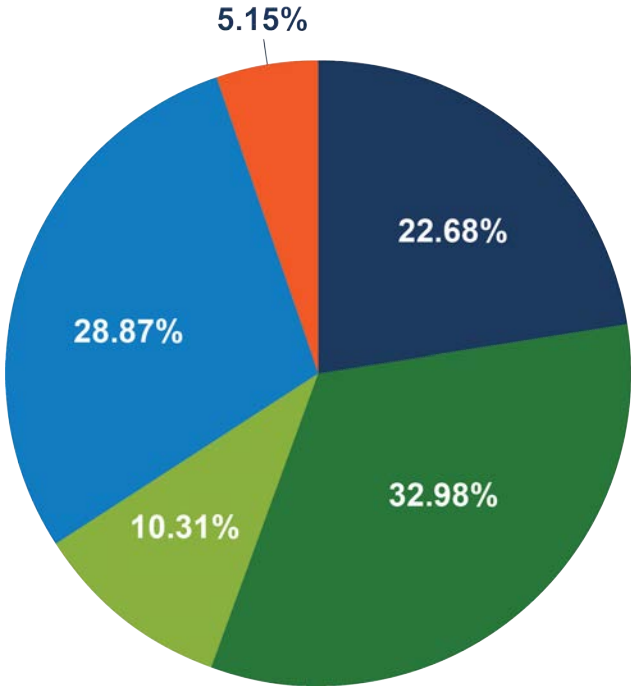


Appendices

Appendix A: WorkshopLV Attendees and Interactive Activity Results

Attendance for the WorkshopLV Environment/Transportation meetings for the Priority Climate Action Plan averaged about 28 participants per meeting. In total, 92 people attended the in-person workshops, and 47 people attended the virtual workshops. The attendees that participated in the workshops ranged from municipal officials, municipal environmental advisory councils, LVPC and LVTS members, active transportation advocacy groups, environment education and sustainability advocacy groups, Greater Lehigh Valley Chamber of Commerce, non-profit groups, commercial and industrial real estate interests, freight industry groups, freight operators, water and sewer authorities, manufacturers and engineers, students and staff from local colleges/universities, representatives from Senator Nick Miller’s office and US Representative Susan Wild’s office, as well as members of the public who have an interest in climate action work.

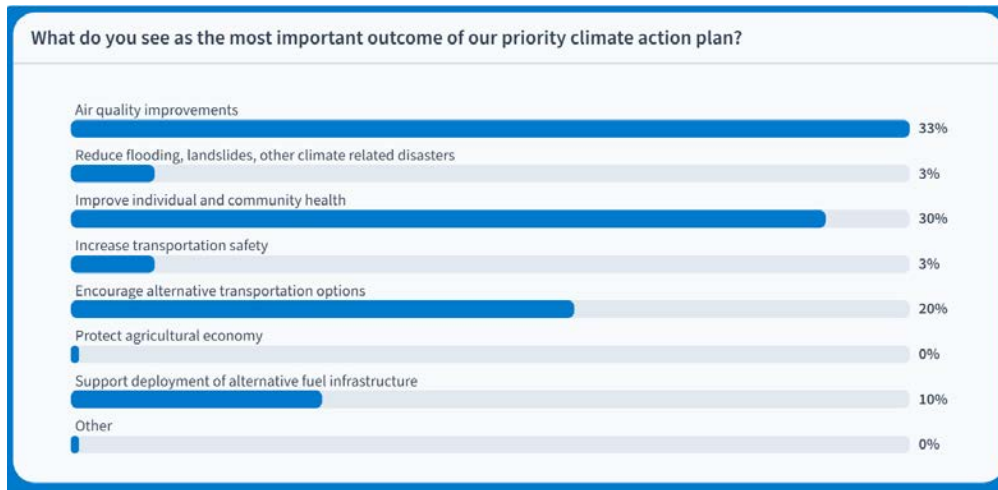
All participants during the public engagement process contributed to the vision and focus for this PCAP, helping make the plan more meaningful and robust.



- LVPC/LVTS Members
- Government officials and staff
- Members of the public
- Non-governmental organizations and non-profits
- Institutions (religious and education)

INTERACTIVE WORKSHOP ACTIVITIES

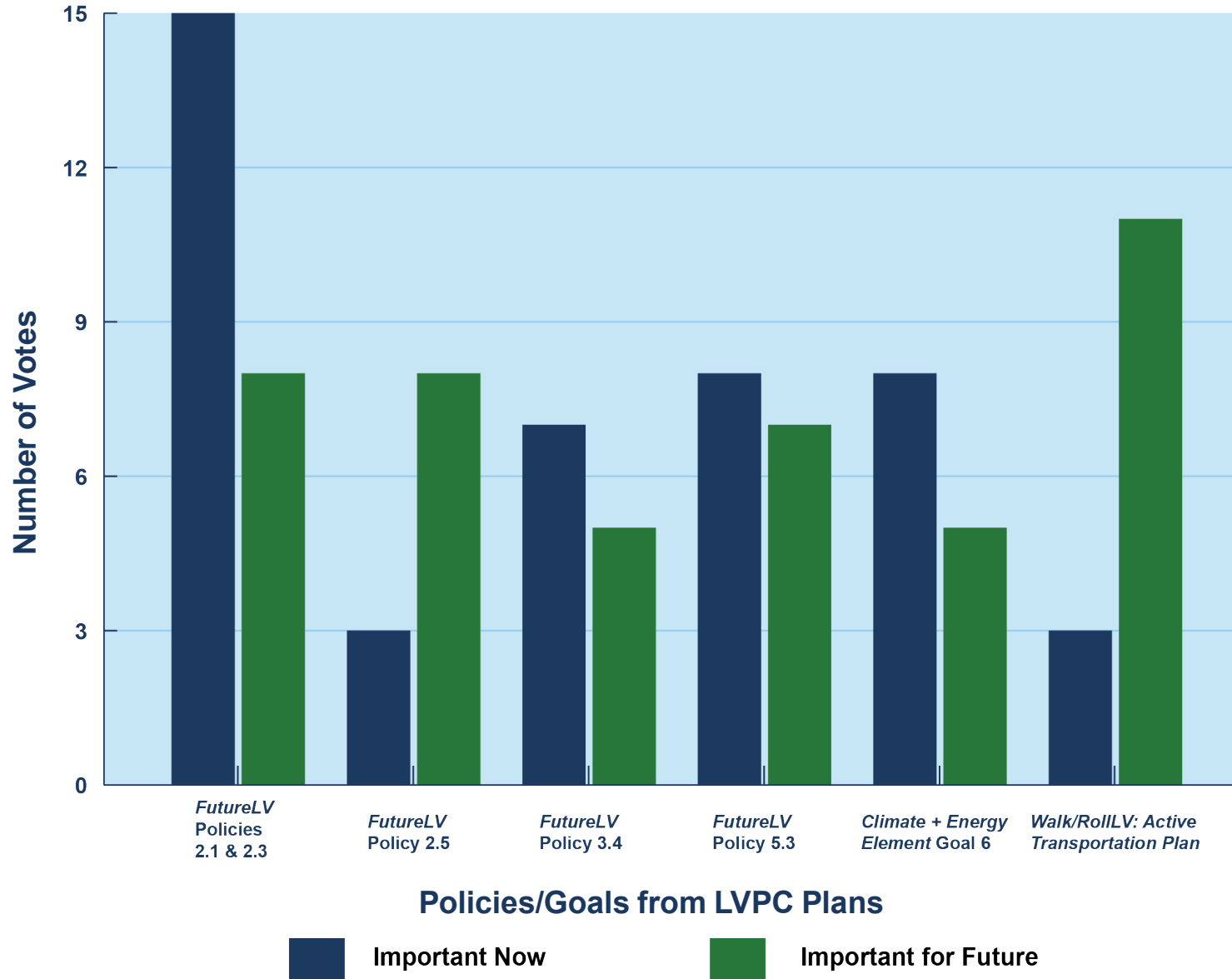
Poll Everywhere question given to participants to answer during the September 2023 Workshop series to gain a general idea of participants' priorities for the PCAP. Results from the October 18, 2023 interactive activity where participants voted on the LVPC/LVTS adopted policy they felt was important now (blue) and the policy they felt was important for the future (green).



KEY FOR ACTIVITY GRAPH

FutureLV Policy 2.1	Develop a mixed-transportation network to support a more compact development pattern, optimize roadway capacity and encourage alternative travel options.
FutureLV Policy 2.3	Encourage enhanced transit connections to improve mobility and job access.
FutureLV Policy 2.5	Support the expansion of technology, communications and utilities to reduce travel demands, optimize traffic flow and prepare for the next generation of jobs.
FutureLV Policy 3.4	Reduce climate change impacts through mitigation and adaptation.
FutureLV Policy 5.3	Create community spaces that promote physical and mental health.
Climate + Energy Element Goal 6	To reduce Lehigh Valley greenhouse gas emissions from residences, government operations and businesses.

WorkshopLV Environment/Transportation Interactive Activity Results



Appendix B:

GHG Reduction Estimates by Measure: Methodology Notes

1. Implement *Walk/Roll/LV: Active Transportation Plan*. Miles of priority corridors to add: 25% complete by 2030 and 50% complete by 2050. GHG figures include improvements to address priority sidewalk gaps in the Lehigh Valley. The total gap mileage was assumed to be constructed by 2050.

▶ **Impact on GHG (Bicycle Corridors):**

- **2030:** -1,099 Metric Tons of Carbon Dioxide Equivalent (CO₂e)
- **2050:** -1,114 Metric Tons CO₂e

▶ **Impact on GHG (Sidewalk Gaps):**

- **2030:** -50 Metric Tons CO₂e
- **2050:** -86 Metric Tons CO₂e

▶ **Methodology Notes: Bicycle Corridors**

- Evaluated proposed bike and walk infrastructure corridors provided in the LVPC *Walk/Roll/LV: Active Transportation Plan* and identified all proposed corridors and identified mileage of new multi-use path and bike lanes.
- Used Geographic Information System (GIS) analysis to assemble data on activity centers (banks, churches, hospitals, shopping areas, schools, etc.) within ½ mile of the proposed corridors.
- A separate GIS analysis was performed to identify the presence of colleges and universities within two miles of the proposed corridors.

- Annual Average Daily Traffic (AADT) for streets adjacent or parallel to the proposed corridor was also collected from the Pennsylvania Road Management System traffic data.
- For this analysis, it is assumed all proposed corridors will be constructed. If only a percentage of infrastructure is expected by 2030 or 2050, then those shares can be provided to the full emission credit above.
- Entered the assembled data in Maryland's Bicycle/Pedestrian Network Improvement Air Quality tool to obtain vehicle trip and Vehicle Miles Traveled (VMT) reductions due to proposed corridors.
- The vehicle trip and VMT reduction was then used in PAQONE7 tool to obtain GHG emission benefits.

▶ **Methodology Notes: Sidewalk Gap Analysis**

- Evaluated LVPC's sidewalk gap analysis, which identified 6.87 miles of priority sidewalk infrastructure needed in the Lehigh Valley.
- Entered new infrastructure mileage into the Georgetown Climate Center TEA-CART tool to obtain GHG emission benefits. The tool has been acquired by PennDOT for their climate action planning.

2. Increasing transit ridership. Increase transit ridership target levels to 9.0 rides per capita by 2030 and 10.5 rides per capita by 2050 from base of 7.5 rides per capita.

▶ **Impact on GHG:**

- **2030:** -1,833 Metric Tons CO₂e
- **2050:** -3,720 Metric Tons CO₂e

▶ **Methodology Notes:**

- LVPC acquired unlinked passenger trips from the Lehigh and Northampton Transportation Authority (LANTA). For 2023, the total annual passenger trips were 3,911,164.
- Assumed targeted passenger trips for future years would be proportional to the targeted increase identified by LANTA for passenger trips per capita. This was calculated to be a 20% increase by 2030 and a 40% increase by 2050.
- Applied % target increase to 2023 passenger trips. The total targeted increase in ridership is +782,233 riders by 2030 and +1,564,466 riders by 2050 over 2023 levels.
- Extracted additional parameters from the Georgetown Climate Center Transportation Evaluation and Carbon Reduction Tool (TEA-CART) tool being used by PennDOT for GHG evaluations and FHWA parameters for national performance measures:

- Assumed that 80% of ridership increase would draw from those that drove before (commuter bus default from TEA-CART).
- Average work trip length by auto (12.7 miles).
- Average vehicle occupancy for Federal Highway Administration reliability national performance measure = 1.7 person/vehicle. (avo_factors.pdf (dot.gov))
- Calculated annual VMT reduction related to transit ridership increases as:
 - **2030:** $782,233 \times 0.80 / 1.7 \times 12.7\text{mi} = - 4,674,993$ vehicle miles
 - **2050:** $1,564,466 \times 0.80 / 1.7 \times 12.7\text{mi} = - 9,349,985$ vehicles miles
- Ran PennDOT's PAQONE7 emission software for the Lehigh Valley to apply MOVES emission rates to the VMT and trip reductions estimated. PAQONE is used by PennDOT for air quality evaluations related to the Congestion Mitigation and Air Quality (CMAQ) funding program. It includes rates for CO₂e.

3. Supporting deployment of alternative fuel vehicles (AFVs) of all types.

Increase share of alternative vehicles in region to 9% of total fleet in 2030 and 21% of total fleet in 2050 consistent with projections in PennDOT's Electric Vehicle (EV) Mobility Plan.

► Impact on GHG:

- **2030:** -285,957 Metric Tons CO₂e
- **2050:** -297,013 Metric Tons CO₂e

► Methodology Notes:

- Utilized the Georgetown Climate Center tool TEA-CART to estimate the impacts of EV adoption in the region. TEA-CART has been obtained by PennDOT to support their statewide GHG evaluations.
- Entered the % of EVs of the total fleet for each model year from 2022 to 2050. Adjusted the default TEA-CART percentages, which were based on the 2023 Annual Energy Outlook (AEO) prepared by the Energy Information Administration (EIA). Adjusted to match alternative fuel vehicle targets in 2030 (9%) and 2050 (21%) per information in PennDOT's EV Mobility Plan.
- Compared benefits of EV adoption to a base scenario assuming no EV growth from 2022 onward.

- Utilized assumptions on Vehicle Miles of Travel (VMT) from the Highway Performance Monitoring System (HPMS) for Lehigh, Northampton, Carbon and Warren (NJ) counties. Assumed growth consistent with that provided in the Lehigh Valley Regional Travel Demand Model.

4. Increase alternative fueling infrastructure and stations.

► Impact on GHG:

- **2030:** -5,644 Metric Tons CO₂e
- **2050:** -13,791 Metric Tons CO₂e

► Methodology Notes:

- This strategy may overlap with the EV adoption benefit measure.
- Estimated needed chargers in the region to meet the EV adoption targets presented in the previous measure. Utilized the US Department of Energy EV-PRO Lite tool ([LINK to EVI-PRO Lite Tool](#)).
- Entered into EV-PRO Lite Tool the 2030 and 2050 EV projections as far as number of vehicles in region:
 - For 2030: Department of Motor Vehicles (DMV) 2022 Total Registrations for region x 9% EV Fleet

- For 2050: DMV 2022 Total Registrations for region x 21% EV Fleet
- 2022 Vehicle Registrations = 269,161 (Northampton) + 303,927 (Lehigh) + 62,180 (Carbon) + 98,079 (Warren) = 733,347 vehicles
- Assume registrations consistent in future years.
- Estimated EV Fleet for 2030 = 733,347 x 9% = 66,001
- Estimated EV Fleet for 2050 = 733,347 x 21% = 154,002
- EV-PRO export needed number of chargers:
 - **2030**
 - Single-Family Charging Ports: 55,324
 - Shared Private Charging Ports: 1,254
 - Public Level 2 Charging Ports: 1,723
 - Public DC Fast Charging Ports: 95
 - **2050**
 - Single-Family Charging Ports: 122,226
 - Shared Private Charging Ports: 2,744
 - Public Level 2 Charging Ports: 3,625
 - Public DC Fast Charging Ports: 186
- From Department of Energy Alternative Fuel Data Center, used the number of public charging stations and ports currently in region:
 - DCFC Stations = 13; Assumed Port count = 61
 - Level 2 Stations = 110; Assumed Port count = 235
- Calculated Needed number of ports to meet needs from EV-PRO tool:
 - 2030 Level2 Needs: 1,723 – 235 = 1,488 ports
 - 2030 DCFC Needs: 95 – 61 = 34 ports
 - 2050 Level2 Needs: 3,625 – 235 = 3,390 ports (Note this overlaps with 2030 needs)
 - 2050 DCFC Needs: 186 – 61 = 125 ports (Note this overlaps 2030 needs)
- Used the Georgetown Climate Center TEA-CART Tool to estimate GHG impacts of new EV charging infrastructure. This tool is available through PennDOT. The tool bases emission benefits on the number of new ports by type.

5. Reimagine and retrofit major transportation corridors with green infrastructure.

This goal includes phasing, starting with landscaping retrofits of approximately 462 acres along Route 22 rights-of-way (ROW) and expanding to other major corridors.

▶ **Methodology Notes:**

- Conducted literature review of carbon sequestration due to forest cover. Extracted conversion factor for carbon sequestered in one year by one acre of average forest: <https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>
- Conversion factor = -0.84 metric tons CO₂/acre/year sequestered annually by one acre of average forest cover.
- Assumed right-of-way (ROW) acres were to be entirely forested; Calculation: 2,745 acres x 0.84 metric tons CO₂e/acre/year.
- These results can be factored for additional corridors or other area planting.

▶ **Low-Carbon Construction Materials Impact on GHG:**

- **2030:** -1,165 Metric Tons CO₂e
- **2050:** -1,165 Metric Tons CO₂e

▶ **Methodology Notes:**

- Examined Environmental Product Declaration (EPD) limits for different construction materials as required by the Inflation Reduction Act (IRA): Interim IRA LEC Material Requirements — used in Pilot May 2023 05162023.pdf (gsa.gov).
- Chose asphalt as an example and noted a 25% benefit between the highest level EPDs and average reported EPDs for that material. Assumed that a 25% reduction in GHG emissions is reasonable through the application of low-carbon materials through transportation construction.
- Identified 64 centerline miles of Transportation Improvement Program projects in the Lehigh Valley. Assumed for this estimate that all projects include reconstruction. Assumed four lane miles of construction for each centerline mile.
- Entered construction assumptions into FHWA's Infrastructure Carbon Estimation (ICE) tool: Carbon Estimator – Tools – Energy – Sustainability – Environment – FHWA (dot.gov)
- Extracted annualized GHG Metric Tons CO₂e related to construction activities (4,660 Metric Tons CO₂e). Assumed this measure could reduce that value by 25% through the use of low-carbon materials.

6. Plan and implement Intelligent Transportation Systems (ITS) technologies. Assume Transportation Systems Management Operation (TSMO) goals implemented along regional highways and major corridors adopted in the *FutureLV: The Regional Plan*.

▶ **Impact on GHG:**

- **2030:** -2,527 Metric Tons CO₂e
- **2050:** -2,010 Metric Tons CO₂e

▶ **Methodology Notes:**

- LVPC acquired annual delay by causal category from PennDOT based on reported INRIX travel time data for 2019. Delay was collected for key corridors in the Lehigh Valley.
- Conducted a literature review of anticipated benefits of TSMO and Intelligent Transportation Systems (ITS). Referenced research from: <https://www.hsdl.org/?view&did=452716> which indicated up to a 40% reduction in incident delay for incident response strategies.

- Assumed a tiered benefit of TSMO strategies by causal factors (40% for incident causes, 30% for work zones and signals, and 20% for recurrent congestion).
- Applied benefits to the 2019 reported annual delay totals for the Lehigh Valley.
- Assumed delay is primarily idling delay. Applied 2030 and 2050 idling emission rates based on the EPA MOVES model.

Appendix C: Data Sources

Map	Dataset	Source	Year
Air Quality Measure	Air Quality	https://www.epa.gov/outdoor-air-quality-data/download-daily-data	2023
Ozone Emissions	Ozone Emissions	https://www.epa.gov/outdoor-air-quality-data/download-daily-data	2023
PM 2.5 Emissions	PM 2.5 Emissions	https://www.epa.gov/outdoor-air-quality-data/download-daily-data	2023
Noise Pollution	Noise Pollution	https://www.bts.gov/geospatial/national-transportation-noise-map	2020
ALL	Justice40	https://ejscreen.epa.gov/mapper/	2023
ALL	EPA Disadvantaged	https://ejscreen.epa.gov/mapper/	2023
Alternative Fuels	EV Charging Stations	https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC	2023
Alternative Fuels	CNG Stations	https://afdc.energy.gov/	2023
Air Quality, Ozone, PM 2.5, Heart Disease, Asthma	AADT PA	https://data-pennshare.opendata.arcgis.com/datasets/a17c20bf71dd40fea24363bb9f0ae0e4_0/explore?showTable=true	2023
Air Quality, Ozone, PM 2.5, Heart Disease, Asthma	AADT NJ	https://njogis-newjersey.opendata.arcgis.com/maps/47a9e9abd50b4f7bbc56db38a373cc43	2023
Air Quality, Ozone, PM 2.5, Heart Disease, Asthma	ADDT PA	https://data-pennshare.opendata.arcgis.com/datasets/a17c20bf71dd40fea24363bb9f0ae0e4_0/explore?showTable=true	2023

Map	Dataset	Source	Year
Air Quality, Ozone, PM 2.5, Heart Disease, Asthma	ADDT NJ	https://njogis-newjersey.opendata.arcgis.com/maps/47a9e9abd50b4f7bbc56db38a373cc43	2023
Freight and Logistics	IFF - Pipeline	https://geodata.bts.gov/datasets/94402ee-698ba4fdebab2b12921dfcf34_0/about	2023
Freight and Logistics	IFF - Air to Truck	https://data-usdot.opendata.arcgis.com/datasets/77a8680802624fd7aa038d52727770ba	2023
Freight and Logistics	IFF - Rail	https://geodata.bts.gov/datasets/usdot::intermodal-freight-facilities-rail-tofc-cofc/about	2023
Freight and Logistics	National Highway Freight Network	https://data-usdot.opendata.arcgis.com/datasets/usdot::national-highway-planning-network/explore?location=40.728110%2C-75.077016%2C12.00&showTable=true	2023
Alternative Transportation	Walkability	https://catalog.data.gov/dataset/walkability-index1	2 3 - Feb
Alternative Transportation	State Bike Routes PA	https://www.penndot.pa.gov/TravelInPA/active-transportation/Pages/Pennsylvania-Bicycle-Routes.aspx	2023
Alternative Transportation	State Bike Routes NJ	https://gisdata-njdep.opendata.arcgis.com/datasets/statewide-trails-in-new-jersey/explore	2023
Adults with Asthma	Asthma	https://ejscreen.epa.gov/mapper/	2023

Map	Dataset	Source	Year
Adults with Heart Disease	Heart Disease	https://ejscreen.epa.gov/mapper/	2023
Alternative Transportation, Alternative Fuels	Transit Routes PA	https://www.arcgis.com/home/item.html?id=f7649f55048e4835873fc81684db9757	2023
Alternative Transportation, Alternative Fuels	Transit Routes NJ	https://njogis-newjersey.opendata.arcgis.com/search?groupIds=60a4f9a1342f4f7a94ac986e8dd14892	2023
Alternative Transportation	Transit Centers PA	https://www.arcgis.com/home/item.html?id=f7649f55048e4835873fc81684db9757	2023
Alternative Transportation	Transit Centers NJ	https://njogis-newjersey.opendata.arcgis.com/search?groupIds=60a4f9a1342f4f7a94ac986e8dd14892	2023
Noise Pollution	Airports	https://hub.arcgis.com/datasets/esri-de-content::world-airports/explore	2023
Right of Way	Study Area - Right of Way	https://data-pennshare.opendata.arcgis.com/datasets/a934887d51e647d295806cc2d9c02097_0/explore	2021
High Crash Corridor	High Crash Corridor	https://data-pennshare.opendata.arcgis.com/datasets/a934887d51e647d295806cc2d9c02097_0/explore	
High Crash Corridor	Corridors - Regional, Major, Congested	https://data-pennshare.opendata.arcgis.com/datasets/a934887d51e647d295806cc2d9c02097_0/explore	2021

Map	Dataset	Source	Year
Land Use	Northampton and Lehigh LVPC Land Use	https://www.northamptoncounty.org/gis https://www.lehighcounty.org/departments/gis	2021
Land Use	Warren County Land Use	https://njogis-newjersey.opendata.arcgis.com/datasets/2deaaa3cadd94166bdbff92a44ade284_5/explore	2020
Alternative Transportation	Bicycle Commuting Corridors	https://www.trailink.com/state/pa-trails/ https://lvgreenways.org/partner-reporting/miles-of-trail-opened-report/	
Alternative Transportation	Bicycle Supported Infrastructure	https://www.trailink.com/state/pa-trails/ https://lvgreenways.org/partner-reporting/miles-of-trail-opened-report/	
PennDOT Driver and Vehicle Services - Annual Report of Registrations		https://www.dmv.pa.gov/VEHICLE-SERVICES/Title-Registration/pages/annual-report-of-registrations-.aspx	2023



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