

Kentucky Transportation Cabinet Carbon Reduction Strategy

As required by 23 U.S.C. 175 (Federal Carbon Reduction Program)

NOVEMBER 2023



TEAM
KENTUCKY[®]
TRANSPORTATION
CABINET

BETTERKY
PLAN



EXECUTIVE SUMMARY

Introduction

The Carbon Reduction Program (CRP) was established by the [Bipartisan Infrastructure Law \(BIL\)](#) to reduce on-road transportation emissions. The Federal Highway Administration (FHWA) issued program guidance on April 21, 2022. The CRP provides approximately \$112 million in new funding to Kentucky over the 5 years authorized in BIL to address the goal of improving the state’s transportation system while reducing carbon emissions. A key requirement is the creation of a Carbon Reduction Strategy (CRS). The purpose of the strategy is to help integrate the CRP guidance into Kentucky’s statewide planning initiatives, working in partnership with its Metropolitan Planning Organizations (MPOs) to identify projects and strategies.

Program Goals

The goals for Kentucky’s CRS are based on, and consistent with, the goals of several recent statewide plans as well as the goals of the Federal CRP. They also incorporate input from Kentucky’s MPOs.

- Goal 1:** Reduce On-Road Carbon Emissions
- Goal 2:** Enhance Safety
- Goal 3:** Improve System Reliability and Efficiency
- Goal 4:** Provide Connectivity and Travel Options
- Goal 5:** Promote Flexibility, Effectiveness and Practicality
- Goal 6:** Benefit all Kentuckians

Requirements and Funding

BIL provides the CRP requirements. The FHWA CRP Implementation Guidance reaffirms those requirements and provides additional information on implementation. This includes direction on funding, project eligibility, and the creation of the CRS. Kentucky’s annual funding allocation is provided in [Table ES-1](#).

TABLE ES-1 KENTUCKY CRP FUNDING BY FISCAL YEAR (MILLIONS)
 SOURCE: USDOT

Total	2022	2023	2024	2025	2026
\$111.9	\$21.5	\$21.9	\$22.4	\$22.8	\$23.3

Note: 2025 and 2026 are estimated



CRP funding is suballocated by area and population with 65 percent assigned based on area type and population. The remaining 35 percent can be used in any area of the state. **Table ES-2** shows the suballocation amounts for the first two years of the program.

TABLE ES-2 KENTUCKY CRP FUNDING SUBALLOCATIONS (MILLIONS)

SOURCE: USDOT

Suballocation		65%				35%
Year	Total	Urban Area			Rural Area	Available for any area
		>200K	50K to 200K	5K to 50K	<5K	
FY 2022	\$21.5	\$4.9	\$0.8	\$2.2	\$6.1	\$7.5
FY 2023	\$21.9	\$5.0	\$0.8	\$2.2	\$6.2	\$7.7
Approx. %	100%	23%	4%	10%	28%	35%

Note: 2025 and 2026 are estimated

Development and Agency Coordination

As required by the guidance, the CRS was developed in consultation with the MPOs. Meetings were held with each MPO to discuss the program and how different MPOs were planning to implement the program. Follow-up group discussions were held as well. These discussions influenced the CRS goals and project/strategy lists. The CRS also lists projects that the MPOs are currently funding using their CRP suballocations. Potential future CRP funded projects are also listed based on the MPO discussions.

Context and Baseline

The transportation sector generates the most GHG emissions nationally. Therefore, the purpose of the CRP is to reduce carbon dioxide from on-road sources. In Kentucky, the transportation sector is the second highest contributor to GHG emissions after electricity production and it has been on the rise since 2008. Most transportation-related emissions are emitted along highways and interstates. Data compiled as part of the development of the CRS shows that these emissions are heaviest in densely populated areas, such as Jefferson and Fayette Counties, as well as in areas traversed by high volume interstates such as I-65 and I-75. Heavy trucks carrying freight through those areas contribute to the increased emissions.

Project Types and Strategies

This section describes the types of projects and strategies appropriate for the varied geography of Kentucky. Projects are listed in the following categories:

- + Traffic Operations and Design
- + Complete Streets, Roads, and Highways
- + Alternative Fuels and Modes
- + Technology
- + Asset Management
- + Freight Projects
- + Other



Future Actions and Evaluations

Kentucky’s Carbon Reduction Strategy Action Plan was developed to provide a flexible roadmap for achieving the strategic goals of the CRS. The CRS Action Plan shown in **Table ES-3** provides a timeframe for the next four years, when an update to the strategy would need to be submitted and approved by FHWA.

TABLE ES-3 CRS ACTION PLAN

Timeframe	Action
2023 Q4	+ FHWA Approval of CRS
	+ Circulate CRS to MPOs, ADDs, and KYTC staff
2024	+ Coordinate with ADDs and MPOs to make sure that all FY 2022 and FY 2023 funding is assigned to eligible projects.
	+ Select new CRP Projects and program future year funding
	+ Consider new project types based on the CRS
2025	+ Select new CRP Projects and program future year funding
	+ Conduct a high-level review of program effectiveness
2026	+ Confirm that all CRP funding for the 5-year cycle is programmed
	+ Conduct a high-level review of program effectiveness
2027	+ Evaluate Program Effectiveness
	+ Prepare and Obtain FHWA Approval of 2027 CRS

Ongoing collaboration with the MPOs and other stakeholders will take place during established quarterly (1) statewide transportation planning meetings, and (2) highway district office meetings.

Because project types will vary depending on the needs of each MPO and region of the state, the following questions should be considered when choosing projects:

1. Does the project reduce on-road carbon emissions?
2. Does the project accomplish the other CRS goals?
3. Is the project consistent with the needs of the local area or region?

It is also critical to evaluate project eligibility, through review of the CRP guidance.

The action plan, project selection framework and evaluation metrics in the current CRS will support the preparation of the 2027 CRS update for Kentucky, which will be completed in accordance with future updates from FHWA regarding the program.



TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
1 INTRODUCTION	1
2 PROGRAM GOALS	2
2.1 Development of the Goals	2
3 REQUIREMENTS AND FUNDING	4
3.1 Bipartisan Infrastructure Law (BIL)	4
3.2 CRP Implementation Guidance	4
3.3 CRS Requirements	5
3.4 CRP Funding	5
4 DEVELOPMENT AND AGENCY COORDINATION	8
4.1 CRS Development	8
4.2 Consultation with MPOs	8
5 CONTEXT AND BASELINE	11
5.1 Emissions Overview	11
5.2 Emissions by Industry Sector	12
5.3 Transportation Emissions	12
5.4 Carbon Emissions by County	14
6 PROJECT TYPES AND STRATEGIES	15
6.1 Traffic Operations and Design	16
6.2 Complete Streets, Roads, and Highways	18
6.3 Alternative Fuels and Modes	20
6.4 Technology	21
6.5 Asset Management	23
6.6 Freight Projects	24
6.7 Other	26
7 FUTURE ACTIONS AND EVALUATIONS	28
7.1 CRS Action Plan	28
7.2 Project Selection Framework	29
7.3 Evaluation Plan	29
7.4 2027 CRS Update	29
APPENDIX A: CRS REQUIREMENT CHECK	30
APPENDIX B: BIL AND CRP GUIDANCE	32
Bipartisan Infrastructure Law (BIL)	32
CRP Implementation Guidance	32



FIGURES

Figure 1 Funding Suballocations by Area	6
Figure 2 Kentucky Urbanized Areas	6
Figure 3 Kentucky MPOs	7
Figure 4 US GHG Emissions by Gas, 2021	11
Figure 5 National and Kentucky GHG Emissions by Sector, 1990 – 2021	12
Figure 6 Emissions by State in 2021	12
Figure 7 Average Daily Traffic	13
Figure 8 2020 On-Road CO ₂ Emissions by County	14
Figure 9 2020 On-Road CO ₂ Emissions per Person by County	14

TABLES

Table ES-1 Kentucky CRP Funding by Fiscal Year (Millions)	i
Table ES-2 Kentucky CRP Funding Suballocations (Millions)	ii
Table ES-3 CRS Action Plan	iii
Table 1 Kentucky CRP Funding by Fiscal Year (Millions)	5
Table 2 Kentucky CRP Funding Suballocations (Millions)	6
Table 3 Kentucky CRP Funding by MPO	7
Table 4 CRP Funded Projects in MPO TIPs	9
Table 5 2021 Kentucky GHG Emissions by Gas (MMT CO ₂ eq.)	11
Table 6 CRS Action Plan	28
Table 7 CRS Evaluation Metrics	29



ACRONYMS

Acronym	Name
ADA	Americans with Disabilities Act
ADD	Area Development District
BIL	Bipartisan Infrastructure Law
CMAQ	Congestion Mitigation & Air Quality
CO ₂	Carbon Dioxide
CRP	Carbon Reduction Program
CRS	Carbon Reduction Strategy
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FY	Fiscal Year
ITS	Intelligent Transportation Systems
KYTC	Kentucky Transportation Cabinet
LRSTP	Long-Range State Transportation Plan
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
SHSP	Strategic Highway Safety Plan
STIP	Statewide Transportation Improvement Program
TAP	Transportation Alternatives Program
TAMP	Transportation Asset Management Plan
TIP	Transportation Improvement Program
TMA	Transportation Management Area
TRIMARC	Traffic Response and Incident Management Assisting the River Cities
TSMO	Transportation Systems Management and Operations
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency



KENTUCKY MPO ACRONYMS

Acronym	Name
CUAMPO	Clarksville Urbanized Area MPO
EMPO	Evansville Metropolitan Planning Organization
KIPDA	Kentuckiana Regional Planning and Development Agency
KYOVA	Kentucky-Ohio-West Virginia Interstate Planning Commission
LAMPO	Lexington Area Metropolitan Planning Organization
OKI	Ohio-Kentucky-Indiana Regional Council of Governments
ODMPO*	Owensboro-Daviess County Metropolitan Planning Organization
REMPO	Radcliff-Elizabethtown Metropolitan Planning Organization
WCMPO*	Bowling Green-Warren County Metropolitan Planning Organization

* Adopted an acronym for some MPOs to help with labels and clarity in some contexts

1 INTRODUCTION



The United States Department of Transportation (USDOT) Carbon Reduction Program (CRP) was established by the [Bipartisan Infrastructure Law \(BIL\)](#), which was signed into law on November 15, 2021. The objective of the program is to reduce on-road transportation emissions through the implementation of statewide strategies and projects implemented using CRP funds. USDOT issued [Carbon Reduction Program Implementation Guidance](#) on April 21, 2022.

In Kentucky, this program provides approximately \$112 million in new funding over the 5 years authorized in BIL with the goal of improving the state's transportation system while reducing carbon emissions. The Federal program was designed to be highly flexible, so it could be adapted to a wide range of contexts and needs across the nation. In Kentucky, this provides the opportunity to simultaneously achieve safety, mobility, and emissions goals in rural and urban areas; meeting critical needs from the mountains of Eastern Kentucky to the lakes and farms in Western Kentucky.

One of the program requirements is that each state develop a Carbon Reduction Strategy (CRS). The CRS is intended to help integrate the CRP into Kentucky's statewide planning initiatives and provide a framework for inter-agency coordination and program implementation. The Kentucky Transportation Cabinet (KYTC) developed this CRS in accordance with Federal requirements, including coordinating with Metropolitan Planning Organizations (MPOs), identifying projects and strategies, and considering the context within which the program is being implemented. The CRS also provides an emissions baseline and documents how various projects and strategies can help reduce those emissions while accomplishing Kentucky's Long-Range Statewide Transportation Plan (LRSTP) goals.

All CRP strategy documents are required to be submitted to the Federal Highway Administration (FHWA) by November 15, 2023, and are scheduled to be updated every four years. [Appendix A: CRS Requirement Check](#) shows how Kentucky's CRS addresses the Federal requirements.

Kentucky's Carbon Reduction Strategy

Kentucky's CRS was developed by the Kentucky Transportation Cabinet (KYTC), based on Federal guidance, agency coordination, and the specific needs of the state. The resulting document has seven chapters:

1. Introduction
2. Program Goals
3. Requirements and Funding
4. Agency Coordination
5. Context and Baseline
6. Projects and Strategies
7. Future Actions and Evaluation

2 PROGRAM GOALS



Kentucky's CRS goals are based on, and consistent with, approved goals from recent, relevant statewide plans, most notably the Long-Range Statewide Transportation Plan. Kentucky's CRS goals incorporate the goals of the Federal CRP. They also consider agency input and Kentucky's specific context and needs. The CRS goals are presented below with references to the sources they are drawn from. While all the goals are important, the first goal is a mandatory program requirement.

2.1 DEVELOPMENT OF THE GOALS

The 2021 BIL states, "The Secretary shall establish a carbon reduction program to reduce transportation emissions." Transportation emissions are defined in BIL as "carbon dioxide emissions from on-road highway sources of those emissions within a State." This is therefore the starting point for the development of the goals.

In addition, KYTC prepares statewide planning documents that guide the design, construction, operations, and maintenance of the multimodal transportation system across the state. It is essential the CRS is consistent with and supports those plans and policy initiatives. Some of the relevant statewide plans and policies include:

- + [2022-2045 Long-Range Statewide Transportation Plan \(LRSTP\)](#)
- + [2020-2024 State Highway Safety Plan \(SHSP\)](#)
- + [2021 Statewide Transportation Improvement Program \(STIP\)](#)
- + [2021 KYTC Strategic Plan](#)
- + [2022 Transportation Asset Management Plan \(TAMP\)](#)
- + [2022 Enacted Six-Year Highway Plan](#)
- + [2022 Complete Streets, Roads, and Highways Policy](#)
- + Modal Plans
 - i. [2022 Kentucky Freight Plan](#)
 - ii. [2015 Statewide Rail Plan \(being updated\)](#)
 - iii. [2022 Truck Parking Assessment and Action Plan](#)
 - iv. [2022 Kentucky Riverports, Highway, and Rail Freight Study](#)



Through discussions with KYTC staff, MPO staff, and other agency partners, it became clear that flexibility, and the ability to implement effective projects, were also very important. Flexibility is also called out specifically in the BIL text and guidance. This topic is addressed in more detail in the Projects and Strategies section.

Goal 1: Reduce On-Road Carbon Emissions

This goal includes not only reducing carbon emissions from on-road vehicles in the state, but also reducing the emissions associated with the construction, operations, and maintenance of those roadways. This is based on the CRP goal of reducing on-road highway emissions. It is also based on the LRSTP goal to “deliver and operate a system that protects or enhances the natural and human environment.” A key objective for that goal is to “reduce emissions.”



Goal 2: Enhance Safety

This goal is focused on reducing fatalities and serious injuries for all transportation system users in concert with emission reduction projects. This goal is consistent with all KYTC plans. It is listed as the first goal in the LRSTP. It is the primary purpose of the SHSP, and it is the first goal listed in the KYTC Strategic Plan, which states “Promote Safety in All Decision Making.” “Prioritizing Safety in All Investments and Projects” is also first in the list of administration priorities in the CRP Guidance.



Goal 3: Improve System Reliability and Efficiency

Efficient transportation systems across all modes can reduce energy consumption and therefore emissions while also lowering travel times and making travel times more consistent. The relevant LRSTP goal is to “establish a reliable flow of people and freight,” with an objective of reducing delays and congestion. This goal is also in line with various modal plan goals and is consistent with the KYTC Strategic Plan mission and goals.



Goal 4: Provide Connectivity and Travel Options

Improved connectivity and additional travel options can enhance mobility while reducing on-road carbon emissions. The LRSTP goal in this area is to “Provide local, regional, and global connectivity for communities,” which includes goals of supporting a multimodal transportation system and providing travel options. This goal is also aligned with the recently adopted Complete Streets, Roads, and Highways Policy and the CRP administrative priority of Complete Streets.



Goal 5: Promote Flexibility, Effectiveness and Practicality

KYTC and the MPOs need flexibility, with a focus on effective and practical projects, to implement the program to meet the needs of Kentucky's varied geographic and demographic landscape. This goal was developed through discussions with agency staff and partners. It is in line with the three KYTC Strategic Plan goals of Delivering Economic Opportunities, Enhancing Quality of Life, and Optimizing Performance through People and Innovation. It also matches with the 2022 Enacted Six-Year Highway Plan that states it is “critical that KYTC makes every effort to address its existing backlog of pavement and bridge needs while pursuing highway improvement projects.”



Goal 6: Benefit all Kentuckians

It is essential that CRP-funded projects provide benefits to residents and businesses across the state, particularly to those in disadvantaged communities. This goal is drawn from the LRSTP guiding principle of “Equity – Seek fairness in mobility and accessibility to meet the needs of all community members.” It also aligns with the CRP administrative priority of Equity which has the objective of enabling the transportation network to effectively serve all community members. It also matches with the KYTC Strategic Plan vision which seeks to “provide transportation infrastructure and services for the 21st century that deliver new economic opportunities for all Kentuckians.”



3 REQUIREMENTS AND FUNDING

The CRP requirements and guidelines come from the 2021 BIL and the 2022 CRP Guidance.

3.1 BIPARTISAN INFRASTRUCTURE LAW (BIL)

The Federal requirements in BIL address the topics below. See [Appendix B: BIL and CRP Guidance](#) for more details.

1. **Program Establishment** – Establishes CRP to reduce transportation emissions
2. **Eligible Projects** – Identifies eligible and potentially eligible project types; USDOT Secretary can certify other projects as eligible based on predicted emissions reductions
3. **Carbon Reduction Strategy** – Requires each state to develop a CRS within two years
4. **Funding and Suballocation** – Suballocates funds and outlines agency coordination
5. **Federal Share** – Defines Federal cost share

3.2 CRP IMPLEMENTATION GUIDANCE

The guidance document reaffirms the purpose and provides additional information on how to implement the program including information on the topics below. See [Appendix B: BIL and CRP Guidance](#) for details.

1. **Administration Priorities** – This section highlights eight priority areas
 - a. Safety
 - b. Transit Flex
 - c. Transferability Between FHWA Programs
 - d. Americans with Disabilities Act (ADA)
 - e. Equity
 - f. Climate Change and Sustainability
 - g. Labor and Workforce
 - h. Truck Parking
2. **Funding** – See [Section 3.4](#)
3. **Carbon Reduction Strategy** – See section below and [Appendix B: BIL and CRP Guidance](#)
4. **Eligibility and Coordination Requirements**
 - a. **General** – Funding may be used on a range of projects that reduce emissions
 - b. **Program Evaluation** – States are encouraged to incorporate program evaluation
 - c. **Eligible Activities** – Discusses eligible and potentially eligible project types and additional flexibility; projects that add general-purpose lane capacity for single-occupant vehicle use will not be eligible absent analyses demonstrating emissions reductions over the project's lifecycle
 - d. **Flexibility on Use of Funds and Certification of Emissions Reduction** – CRP funds may be used for other projects if the USDOT Secretary certifies that the State has demonstrated a reduction in transportation emissions (1) as estimated on a per capita basis, and (2) as estimated on a per unit of economic output basis



e. **Consultation and Coordination**

- i. **Coordination in Urbanized Areas** – In a non-TMA urbanized area, the State must coordinate with the MPO that represents the area
- ii. **Consultation in Rural Areas** – In a rural area, the State must consult with the regional transportation planning organization that represents the area

3.3 CRS REQUIREMENTS

Kentucky is required to develop a CRS in consultation with the MPOs and submit it to FHWA by November 15, 2023. States, in coordination with MPOs, are encouraged to integrate the CRS into their transportation planning processes, including Long-Range Statewide Transportation Plans and Metropolitan Transportation Plans. The CRS shall:

- + Support efforts to reduce transportation emissions
- + Identify projects and strategies to reduce carbon emissions, which may include projects and strategies for safe, reliable, and cost-effective options:
 - To reduce traffic congestion by facilitating the use of alternatives to single-occupant vehicle trips, including public transportation facilities, pedestrian facilities, bicyclist facilities, and shared or pooled vehicle trips
 - To facilitate the use of vehicles or modes of travel that result in lower transportation emissions per person-mile traveled as compared to existing vehicles and modes, and
 - To facilitate approaches to the construction of transportation assets that result in lower transportation emissions as compared to existing approaches
- + Support the reduction of transportation emissions
- + Quantify the total carbon emissions from the production, transport, and use of materials used in the construction of transportation facilities (at the discretion of the state)
- + Be appropriate to the population density and context of the state and its MPOs

3.4 CRP FUNDING

Kentucky will receive approximately \$112 million in CRP funding over the five years of BIL as shown in **Table 1**. The funds will be suballocated based on area and population as directed in the legislation. Specifically, 65 percent of the CRP funds will be apportioned to the following areas in proportion to their relative share of the state’s population.

- + Urbanized areas with an urbanized area population greater than 200,000
- + Urbanized areas with an urbanized area population of 50,000 to 200,000
- + Urban areas with a population of at least 5,000 and no more than 49,999
- + Areas with a population of less than 5,000

The remaining 35 percent of the State’s CRP apportionment may be obligated in any area of the state.

TABLE 1 KENTUCKY CRP FUNDING BY FISCAL YEAR (MILLIONS)

SOURCE: USDOT

Total	2022	2023	2024	2025	2026
\$111.9	\$21.5	\$21.9	\$22.4	\$22.8	\$23.3

Note: 2025 and 2026 are estimated



Table 2 shows the first two years of CRP funding by the suballocation area. As shown, the largest single funding category is available for use anywhere in the state. However, the second highest amount is the funding that is designated for rural areas of the state (population under 5,000). Figure 1 illustrates the distribution of funds by suballocation areas. Figure 2 shows the four areas on a map, highlighting the designated urban areas across the state. All funding must be obligated within three years from the end of the fiscal year (FY) in which it became available.

TABLE 2 KENTUCKY CRP FUNDING SUBALLOCATIONS (MILLIONS)

SOURCE: USDOT

Suballocation	Year	Total	65%			35%	
			>200K	50K to 200K	5K to 50K	Rural Area	
						Available for any area	
	FY 2022	\$21.5	\$4.9	\$0.8	\$2.2	\$6.1	\$7.5
	FY 2023	\$21.9	\$5.0	\$0.8	\$2.2	\$6.2	\$7.7
	Approx. %	100%	23%	4%	10%	28%	35%

Note: 2025 and 2026 are estimated

FIGURE 1 FUNDING SUBALLOCATIONS BY AREA

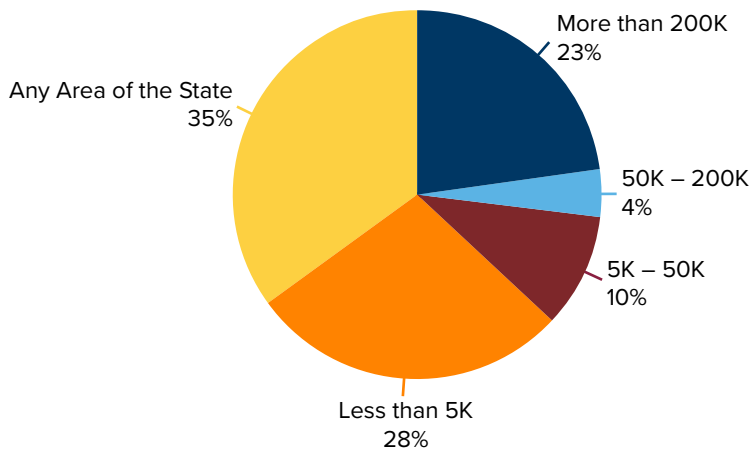
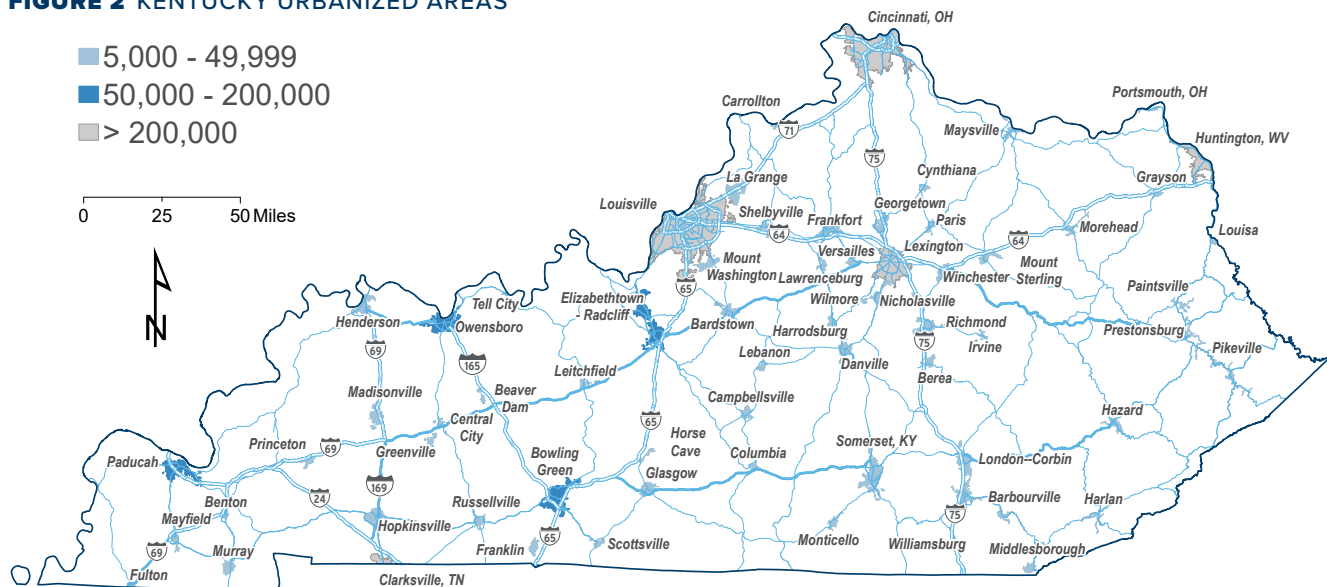


FIGURE 2 KENTUCKY URBANIZED AREAS





The urban areas of 50,000 or more are represented by nine MPOs. The funding allocated to each of those MPOs for 2022 and 2023 is based on population and is shown in **Table 3**. The suballocated funds increased from 2022 to 2023. Future increases are expected based on the projected increase in BIL funding. **Figure 3** shows the nine current Kentucky MPOs.

TABLE 3 KENTUCKY CRP FUNDING BY MPO (\$)

Population Categories	Urbanized Area/MPOs	Population (2010)*	FY 2022	FY 2023
Areas Over 200K	Cincinnati/ OKI	328,060	1,056,540	1,077,670
	Evansville/ EMPO	28,583	92,053	93,895
	Huntington/ KYOVA	56,594	182,265	185,910
	Lexington/ LAMPO	290,263	934,812	935,508
	Louisville/KIPDA	832,366	2,680,691	2,734,305
	Total	1,535,866	4,946,361	5,045,288
Areas Between 50K and 200K	Bowling Green/ WCMPO	78,306	252,190	257,234
	Clarksville/ CUAMPO	20,346	65,526	66,836
	Elizabethtown/ REMPO	73,467	236,605	241,338
	Owensboro/ ODMPO	70,543	227,188	231,732
	TOTAL	242,662	781,509	797,140

* FHWA used 2010 urban area population data for the 2022 and 2023 funding allocations.

FIGURE 3 KENTUCKY MPOS



4 DEVELOPMENT AND AGENCY COORDINATION



4.1 CRS DEVELOPMENT

Kentucky's CRS was initiated in early 2023 and has been developed through research, discussion, and investigation and agency coordination efforts. The investigation work included a review of what other states have done with respect to carbon reduction, which revealed both opportunities and challenges related to such initiatives. The data available from USEPA and other sources was also gathered, evaluated, and is discussed in the next section.

4.2 CONSULTATION WITH MPOS

Development of the CRS included individual meetings with staff from all nine MPOs to discuss program implementation. These initial meetings occurred in June 2023. There were follow-up group discussions with the MPOs at quarterly meetings in July and October. Presentations were also given at the quarterly State Transportation Planning meetings in July and October. These larger meetings included representatives from the MPOs, Area Development Districts (ADDs), KYTC District Offices, KYTC Central Office, and FHWA.

Key issues that were raised by the MPOs during the one-on-one discussions and quarterly meetings included:

- + Staffing and program implementation limitations
- + Need to integrate CRP/CRS into current programming processes
- + Interest in new project types
- + Importance of meeting obligation deadlines
- + Funding match limitation
- + Concern that the federal goal of net zero by 2050 is aggressive
- + For some MPOs, concern that funding levels are very small and harder to program
- + Need to coordinate with other related programs such as CMAQ and TAP

In addition to discussing challenges and opportunities, there were extensive discussions about the current and potential future uses of CRP funds. This included projects that have already been programmed into MPO Transportation Improvement Programs (TIPs) as well as possible future aspirational projects that were being considered. Since those meetings, some of the MPOs have programmed additional CRP funding in their respective TIPs.

Based on discussions with the MPOs and a review of the most recent TIPs, the Kentucky-based projects that are currently CRP-funded have been identified and are listed in the next section. Several border-state projects funded by Kentucky-affiliated MPOs are also listed at the bottom of the table for reference (most MPOs in Kentucky are bi-state or tri-state agencies).



4.2.1 CURRENT CRP-FUNDED PROJECTS

The 12 Kentucky projects listed in **Table 4** are currently funded by the CRP in the most recent MPO Transportation Improvement Programs (TIPs). The projects total over \$17 million and cover alternative fuels; complete streets, roads, and highways; transit; and pedestrian and bicyclist infrastructure projects. Projects in portions of the MPOs that are outside of Kentucky are also listed for reference.

TABLE 4 CRP FUNDED PROJECTS IN MPO TIPS

MPO	Project Name	Description
KIPDA	Dixie Highway Streetscape	Construct Complete Street including ped/bike facilities
	Taylorsville Road Shared Use Path	Design shared-use path in Jeffersontown
	Dodge Gap Shared Use Path	Right-of-way for shared use path, part of Louisville Loop
	Westport Road Sidewalk	Construct sidewalks through I-265 interchange
	Ohio River Levee Trail	Construct ped/bike path along Campground Road
	Louisville Loop	Construct shared use path in Eastwood area
	Pond Creek Shared Use Path	Right-of-way for shared-use path and bridge at Pond Creek
	Muhammad Ali/Chestnut Corridor	Construct improved bus stops and access/connections
	Eastern Parkway/Preston Corridor	Construct improved bus stops and access/connections
LAMPO	Lextran Electric Bus	Purchase battery electric bus, transit capital project
OKI	Northern Kentucky International Airport Charging Facilities	Public EV Charging Infrastructure on airport property
	Covington Charging Facilities	Public EV Charging Infrastructure at 4 parking garages
Projects Outside Kentucky in Multi-State MPOs		
EMPO	US 41/Washington Avenue	Construct pedestrian walkway in the City of Evansville*
	Oak Hill Rd (two projects)	Reconstruct road with ped/bike accommodations*
	Epworth Road	Widen road with ped/bike accommodations*
KYOVA	South Point SW project	Construct sidewalks through downtown South Point*
	Parking Deck	Construct intermodal parking facility in Ironton, Ohio*
OKI	EV Charging Projects	Install EV Charging Stations at 13 locations in Ohio

* These projects are funded with multiple funding sources. CRP is only one of the sources.



4.2.2 POTENTIAL FUTURE CRP PROJECTS

In addition to the funded projects listed previously, the following project types were discussed with the MPOs as possible future projects or projects of interest.

Some of these project types are eligible for CRP funding. Other project types may be eligible with the necessary documentation of emissions reductions, but some project types may not be eligible. See **“Project Types and Strategies” on page 15** for additional discussion of eligible project types and the documentation required for the USDOT Secretary to certify a project as eligible.

CRP Eligible Projects

- + Intelligent Transportation Systems (ITS) Projects
- + Signal Improvements
- + Adaptive Signal Systems

Potentially Non-CRP Eligible

- + Truck Parking (eligible if it includes truck parking electrification)
- + Rural On-Demand Transit (transit capital projects may be eligible)
- + Rural Internet Connectivity
- + Planning Studies (e.g., Transit-Oriented Development Planning)

Agencies should obtain direction from FHWA for projects that are not listed in the [CRP Guidance](#) as clearly eligible. It may be possible to demonstrate that a project reduces on-road CO₂ emissions and obtain clearance to fund a project, but that process should be started as soon as possible for each project. See **“Project Types and Strategies” on page 15** of this document and [CRP Guidance](#) for more information.



5 CONTEXT AND BASELINE

5.1 EMISSIONS OVERVIEW

The CRP is focused on reducing carbon dioxide (CO₂) from on-road sources. CO₂ is one of several gases that are considered Greenhouse Gases (GHGs). GHGs trap heat from escaping the atmosphere at night as the surface of the earth usually cools. GHGs are different from other gases in that they absorb the wavelengths of radiation produced by the planet. The transportation sector is the largest contributor to GHG in the US, followed closely by the generation of electricity. Most transportation-related GHG emissions are emitted along highways and interstates by light-, medium-, and heavy-duty vehicles.

The USEPA Greenhouse Gas Inventory Data Explorer provides a comprehensive accounting of GHG emissions in the United States each year. Carbon dioxide, methane (CH₄), nitrous oxide (N₂O), and fluorinated gases are documented in the annual inventory. The national percentage of each gas in 2021 is presented in Figure 4. As shown, 79 percent of all national GHG emissions was CO₂. In Kentucky, in that same year, 81 percent of GHG emissions were CO₂, as shown in Table 5. The CRS for Kentucky focuses on the primary GHG emitted by human activities, CO₂.

FIGURE 4 US GHG EMISSIONS BY GAS, 2021

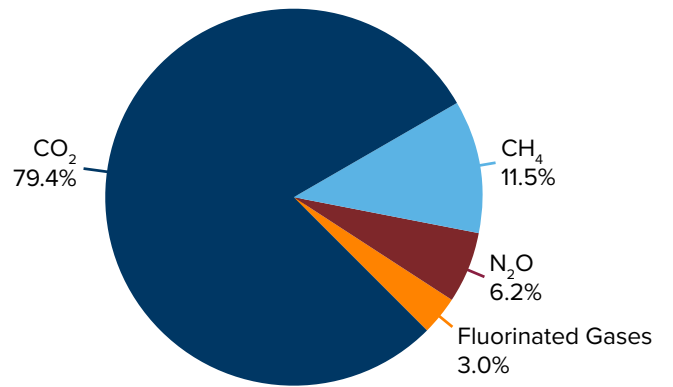


TABLE 5 2021 KENTUCKY GHG EMISSIONS BY GAS (MMT CO₂ EQ.)

SOURCE: USEPA GREENHOUSE GAS INVENTORY DATA EXPLORER

Greenhouse Gas	Abbreviation	Emissions	Percent
Carbon Dioxide	CO ₂	112.398	81%
Methane	CH ₄	14.536	10%
Nitrous Oxide	N ₂ O	6.381	5%
Fluorinated gases	-	6.047	4%
Gross Total		139.362	100%

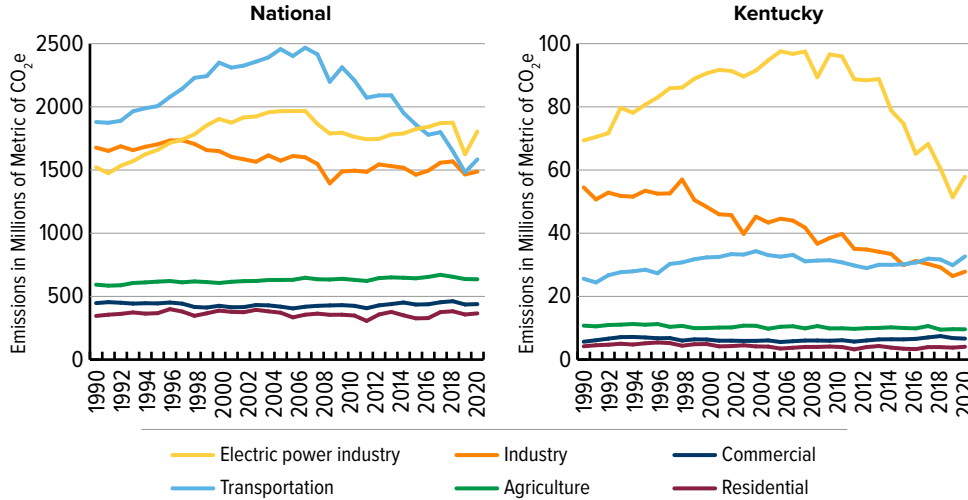
Notes: MMT CO₂ eq. = million metric tons- of carbon dioxide equivalent; total methane and nitrous oxide emissions data include land-use and forestry sector related emissions, gross total adjusted to match sum of four gases.



5.2 EMISSIONS BY INDUSTRY SECTOR

The USEPA inventory also provides information on emissions by sector since 1990 for the US and Kentucky. As shown in **Figure 5**, the transportation sector generates the most GHG emissions nationally, followed by the electric power industry. In Kentucky, this is reversed with the electric power industry generating the most emissions and transportation ranking second. However, transportation emissions in Kentucky have generally risen since 2008 and are now near the peak recorded in the early 2000s.

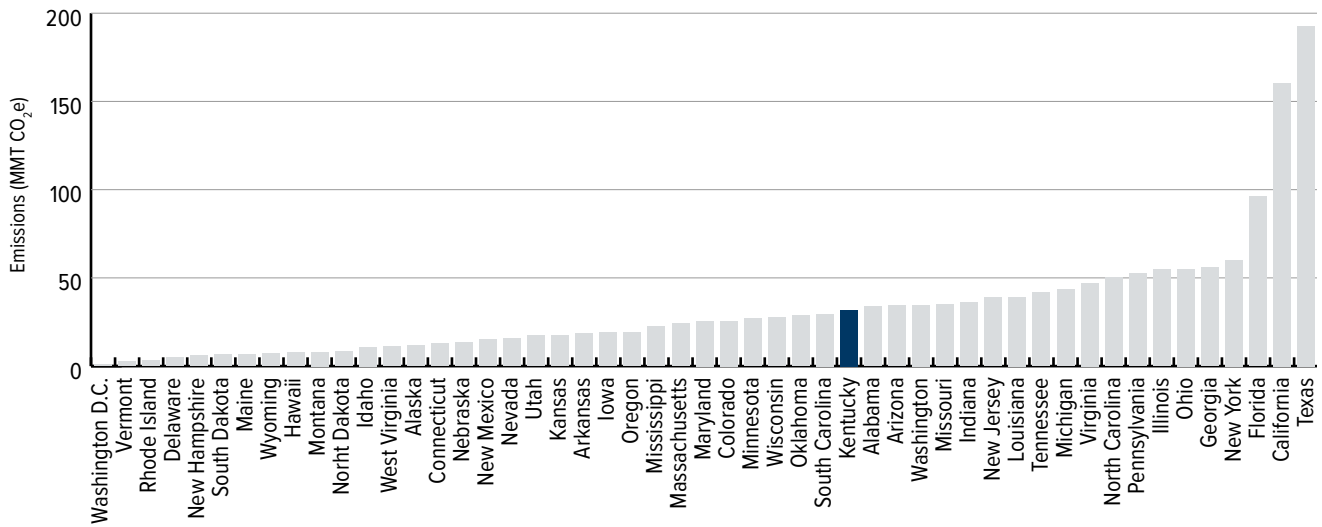
FIGURE 5 NATIONAL AND KENTUCKY GHG EMISSIONS BY SECTOR, 1990 – 2021
 SOURCE: USEPA



5.3 TRANSPORTATION EMISSIONS

Kentucky ranks 20th in the US for transportation emissions as shown in **Figure 6**. It ranks 10th in transportation emissions per capita. Several factors contribute to the state's rankings, such as road miles, population density, land use patterns, and freight movement in and through the state.

FIGURE 6 EMISSIONS BY STATE IN 2021
 SOURCE: USEPA

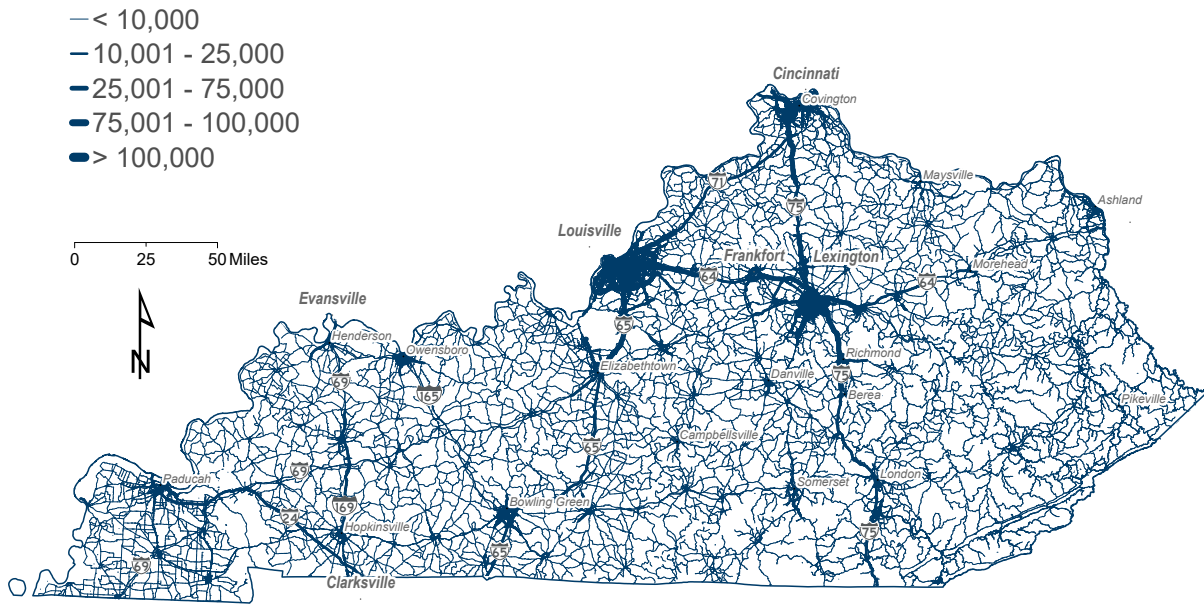




Kentucky has two important north-south interstate freight corridors with I-65 and I-75. It is estimated that over five percent of all vehicle miles traveled in the state are associated with trucks traveling through the state. Kentucky is also home to several major industries including transportation and logistics and auto manufacturing, both of which generate considerable freight traffic. Heavy-duty diesel truck emissions are estimated to account for 25 percent of the CO₂ emissions in the state. Reducing emissions from these vehicles could be difficult for Kentucky to address alone given the interstate nature of freight shipping.

The Kentucky Transportation Cabinet estimates that 132 million vehicle-miles were traveled daily in the state in 2021. This is an increase from 127 million in 2020 (4%) and a decrease from the previous high of 136 million in 2019 (-3%). This traffic is spread across over 80,000 centerline miles of public roads. Approximately 27,620 of those miles are maintained by the state and 944 miles are designated as Interstates. While Interstates make up only 1.2 percent of the total public centerline miles, they account for nearly a third of the daily vehicle-miles traveled in the state. **Figure 7** illustrates daily traffic flows in the state.

FIGURE 7 AVERAGE DAILY TRAFFIC
 SOURCE: KYTC



The USEPA National Emissions Inventory (NEI) Data attributed over 27 million tons per year of carbon dioxide in 2020 to on-road sources in Kentucky. On-road sources account for over 85 percent of all transportation CO₂ emissions in the state. Non-Diesel Light Duty Vehicles (i.e., passenger cars and pickup trucks) account for 56 percent and Diesel Heavy Duty Vehicles (tractor trailers) 25 percent of the on-road emissions.

5.4 CARBON EMISSIONS BY COUNTY

As illustrated in **Figure 8**, the highest carbon dioxide emissions in the state are found in Kentucky's two most populated counties, Jefferson and Fayette, which are home to the two largest cities, Louisville and Lexington respectively. These counties have a comparatively high density of roads, population, and industry, translating to high daily auto and truck travel. In these cities, cultural and educational institutions, healthcare services, major shopping areas, sports venues, and large employers also contribute to vehicle miles traveled.

FIGURE 8 2020 ON-ROAD CO₂ EMISSIONS BY COUNTY
SOURCE: USEPA, NEI

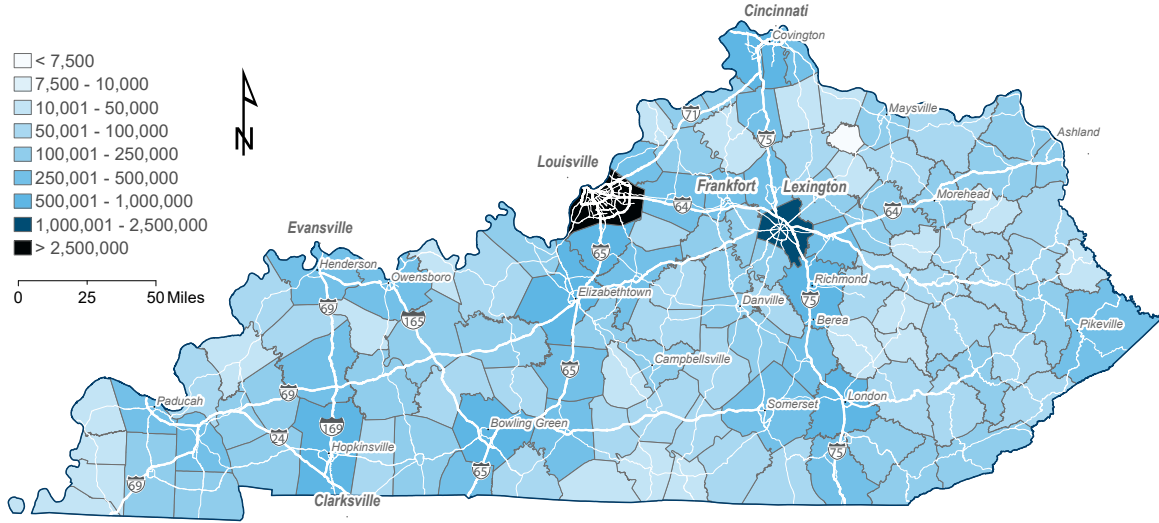
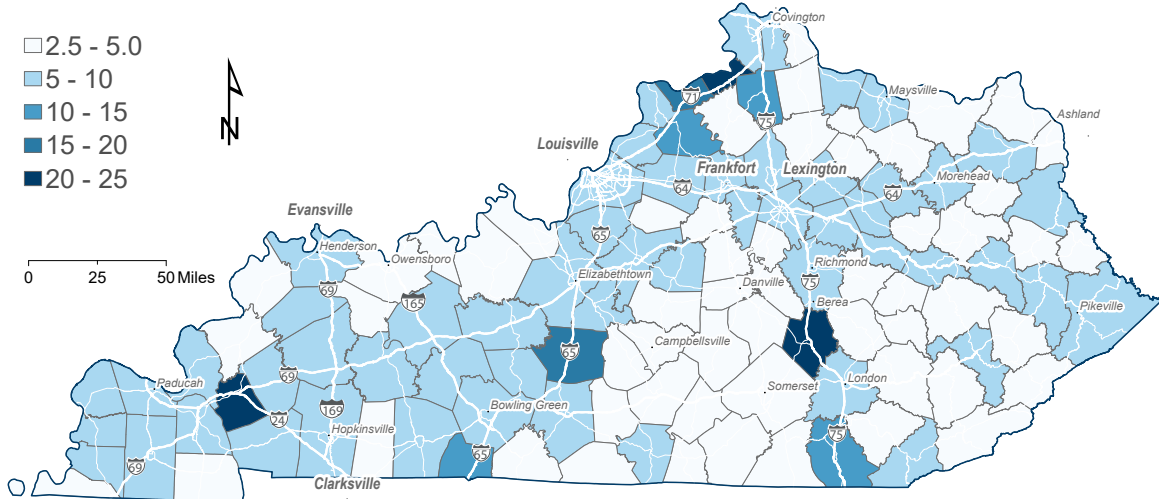


Figure 9 illustrates the total carbon dioxide emissions per capita for each county. Counties with low populations and interstate highways are among the highest generators of per capita transportation emissions. This is due to the large volume of truck traffic flowing through the county. This figure illustrates the importance of reducing emissions from freight as it flows to, from, and through the state.

FIGURE 9 2020 ON-ROAD CO₂ EMISSIONS PER PERSON BY COUNTY
SOURCE: USEPA, NEI





6 PROJECT TYPES AND STRATEGIES

Given Kentucky's varied geography, development patterns, rural/urban context, and economic activities, a range of project types and strategies will be needed to reduce on-road emissions, while achieving the other transportation system goals identified in this document and the LRSTP. Based on BIL, CRP guidance, research conducted for this CRS, and input from the MPOs and other agency stakeholders, seven categories of projects and strategies have been identified.

Projects in all seven categories are currently being planned, designed, and implemented across the state. Some are being implemented with CRP funding, while others could be eligible for CRP funding. There are also several projects listed at the end of this section that may be beneficial for carbon reduction but may not be eligible for CRP funding.



Traffic Operations and Design



Complete Streets, Roads, and Highways

(Inc. Ped/Bike Facilities)



Alternative Fuels and Modes



Technology



Asset Management



Freight



Other



6.1 TRAFFIC OPERATIONS AND DESIGN

Traffic operations and design include a wide range of projects that are designed to reduce congestion and thereby reduce on-road emissions. The projects may address recurring congestion due to commuter traffic, or non-recurring congestion due to crashes and work zones. Some related projects and strategies such as Transportation System Management and Operations (TSMO) projects are also included in the Technology category ([6.4 Technology](#)).



Traffic Signal and Signal System Upgrades

Upgrading a traffic signal or a signal system typically targets improved vehicle detection and signal timing efficiency. Such upgrades can reduce emissions by reducing vehicle travel time and delay at signals.

- + **Policy** – KYTC published a revised [Traffic Operations Guidance Manual in 2021](#) and maintains Traffic Control Device Design Standards.
- + **Urban** – KYTC and Louisville Metro improved technology on over 100 signals along Hurstbourne Parkway, Westport Road, and other major intersections to improve signal communication and reduce delay.
- + **Rural** – KYTC recently upgraded the signal system on US 641 through Murray to implement 2070 Controllers with Wavetronix detection, combined with timing upgrades, to improve signal efficiency and reduce delay.



Traffic Roundabouts

Converting an intersection to a roundabout typically decreases emissions through more efficient flow and fewer stops.

- + **Policy** – KYTC published a [Roundabout Design Guidance Manual](#) in February 2023.
- + **Urban** – KYTC and the City of Elizabethtown are installing 10 roundabouts on US 62 and other city streets to improve efficiency along those routes.
- + **Rural** – KYTC recently began construction of a roundabout on KY 727 in Whitley County to improve safety and efficiency near Corbin Primary School.



Road Diets

Road diets most often involve the conversion of a four-lane undivided highway to a three-lane highway. Incorporating a center turn lane can improve traffic flow and efficiency. These conversions frequently provide new space for bicyclist and pedestrian accommodations.

- + **Urban** – KYTC and the City of Lexington converted Euclid Avenue to a three-lane section to improve efficiency and add bike lanes in each direction.
- + **Rural** – KYTC converted US 31E in Bardstown from US 62 to KY 245 from a four-lane section to a three-lane section to improve efficiency and safety along the corridor.



TEXT FROM FHWA CRP GUIDANCE ON PROJECT ELIGIBILITY



1. Projects that “establish or operate a traffic monitoring, management, and control facility or program”
2. “Advanced transportation and congestion management technology projects”
3. “Certain types of projects to improve traffic flow that are eligible under” CMAQ (and do not involve construction of new capacity)
4. Project or strategy designed to support “congestion pricing ... including electronic toll collection”
5. Project or strategy designed to support “shifting transportation demand to nonpeak hours or other transportation modes, increasing vehicle occupancy rates, or otherwise reducing demand for roads,” including “travel demand management strategies and programs”
6. “Projects that separate motor vehicles from pedestrians and bicyclists, match vehicle speeds to the built environment, increase visibility (e.g., lighting), and advance implementation of a Safe System approach and improve safety for vulnerable road users may also be eligible”

6.2 COMPLETE STREETS, ROADS, AND HIGHWAYS

Complete Streets, Roads, and Highways (including infrastructure for pedestrians, bicyclists, and transit) offer the opportunity for people to choose how to move from place to place. In developed areas, this could mean choosing to walk, bike, ride a micro-mobility device or wheelchair, drive, ride as a passenger, or ride transit. A Complete Street, Road, or Highway facilitates safe mobility for all users. They reduce the need for driving and promote active transportation (walking or biking) as well as other lower-emission modes.



Complete Streets, Roads, and Highways

Complete Streets, Roads, and Highways reduce emissions by providing safe lower-emission travel options.

- + **Policy** – KYTC published the [Complete Streets, Roads, and Highways Manual](#) and adopted the [Complete Streets, Roads, and Highways Policy](#), which both apply to all planning and design projects.
- + **Urban** – The Market Street project in Louisville is an urban Complete Streets project that will promote lower-emission travel modes.
- + **Rural** – Improving KY 90 in Pulaski County is a more rural project that could promote alternative modes with the inclusion of pedestrian infrastructure.



Pedestrian Infrastructure

Pedestrian infrastructure typically includes sidewalks and shared-use paths. These facilities can especially reduce emissions when designed to serve non-recreational trip purposes.

- + **Policy** – KYTC's [Complete Streets, Roads and Highways Policy](#) and design standards address the need for sidewalks, as do many planning studies by local agencies.
- + **Urban** – Several sidewalks are planned and funded to connect neighborhoods to Dixie Highway in southwest Louisville. The sidewalks would serve school, work, personal, and shopping trips.
- + **Rural** – Sidewalks are planned along Cumberland Ave in Middlesboro as part of roadway reconstruction. This project is currently in the design phase.



Bicyclist Infrastructure

Bicyclist infrastructure typically includes on-street bike facilities and shared-use paths. These facilities can especially reduce emissions if designed to serve non-recreational trip purposes.

- + **Policy** – KYTC's [Complete Streets, Roads and Highways Policy](#) and design standards address the need for bicyclist facilities, as do many planning studies by local agencies.
- + **Urban** – A shared-use path is currently being designed as part of a larger project on US 62 in Elizabethtown. This project will allow cyclists to safely access work and shopping areas.
- + **Rural** – A shared-use path is being constructed along the Friendship Road corridor in Paducah. This corridor provides access from residential areas in the southern part of the county to the commercial areas in the western part of the county. The shared-use path will also improve multi-modal connections to Lone Oak Elementary School and West Kentucky Community and Technical College.



TEXT FROM FHWA CRP GUIDANCE ON PROJECT ELIGIBILITY

1. Certain transportation alternative projects (as defined before the FAST Act), including “on-road and off-road trail facilities for pedestrians, bicyclists, and other nonmotorized forms of transportation”
2. “Projects that maximize the right-of-way for nonmotorized modes ... that increase safety, equity, accessibility, and connectivity may be eligible”
3. “Projects that separate motor vehicles from pedestrians and bicyclists ... and improve safety for vulnerable road users may also be eligible”
4. “Micromobility and electric bike projects, including charging infrastructure, may also be eligible”



6.3 ALTERNATIVE FUELS AND MODES

Alternative fuels and modes are direct ways to reduce on-road carbon emissions. The major shift occurring at present is the rise of battery electric vehicles, though other technologies are being pursued such as hydrogen power. Alternative modes (and the elimination of trips) can also substantially reduce carbon emissions. This includes transit, non-motorized travel, micro-mobility (such as bike share, e-bikes and e-scooters), telecommuting and other virtual activities.



Electric Vehicle Charging Infrastructure

Deployment of charging infrastructure can encourage increased electric vehicle ownership. This could include stations along Federal Alternative Fuel Corridors (AFCs), as well as other priority highways, in communities, or at major destinations in the state.



- + **Policy** – KYTC published an [Electric Vehicle Infrastructure Deployment Plan](#) that has been approved by FHWA.
- + **Urban/Rural** – KYTC is currently implementing EV charging infrastructure on both urban and rural interstate corridors throughout Kentucky.

Public Transportation Capital Projects

Public transportation can offer travelers a choice in how they travel, and typically results in lower emissions per person-mile traveled than automobile travel. Transit agencies around the state have committed to replacing aging vehicles with diesel-electric hybrid buses and 100 percent battery electric buses.



- + **Examples** – LexTran is purchasing an electric bus with CRP funding. Several other transit capital projects in the state could be eligible for CRP funds.

Diesel Engine Retrofits

Diesel retrofits offer a cost-effective way to reduce air emissions. Diesel oxidation catalysts and diesel particulate filter retrofits are commonly used retrofit technologies.

- + **Example** – Kentucky has an ongoing program to reduce school bus emissions.



TEXT FROM FHWA CRP GUIDANCE ON PROJECT ELIGIBILITY

1. Public transportation projects, including “eligible capital projects for the construction of a bus rapid transit corridor or dedicated bus lanes”
2. Projects “to support deployment of alternative fuel vehicles”, including alternative fuel infrastructure and “purchase or lease of zero-emission construction equipment and vehicles”
3. “Projects that maximize the right-of-way for ... transit options that increase safety, equity, accessibility, and connectivity may be eligible”
4. Projects “for diesel engine retrofits”

6.4 TECHNOLOGY

For the purposes of this document, “technology” includes activities associated with leveraging technology, both existing and emerging, to improve travel efficiency and reduce both congestion and emissions. This encompasses a broad range of communication and electronic technologies. Applications include Traffic Management Centers, Intelligent Transportation Systems, Vehicle-to-Vehicle communications, and dynamic mobility applications.



Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) include a variety of technologies to facilitate traffic management, reduce driver delay, and lower emissions.

- + **Urban** – The Northern Kentucky Active Transportation and Demand Management Study looked at options to address congestion on I-71, I-75 and I-471 through the implementation of dynamic signs, queue warning systems and ramp metering.
- + **Rural** – KYTC has deployed numerous dynamic message signs and cameras on rural interstates throughout Kentucky to monitor traffic conditions and provide traveler information.



Traffic Incident Management

Traffic Incident Management (TIM) involves how responders manage traffic during a crash or other incident. TIM can reduce driver delay and lower emissions while maintaining safety for responders and drivers.

- + **Urban** – The Traffic Response & Incident Management Assisting the River Cities (TRIMARC) Freeway Service Patrol assists disabled motorists in reducing congestion on the interstates.
- + **Rural** – KYTC, in conjunction with the Kentucky Transportation Center, sponsors training for local Emergency Responders on the steps necessary to restore normal traffic flow.



Traffic Systems Management and Operations

Traffic Systems Management and Operations (TSMO) is an umbrella term for various operational and management strategies intended to optimize the performance and safety of the transportation system.

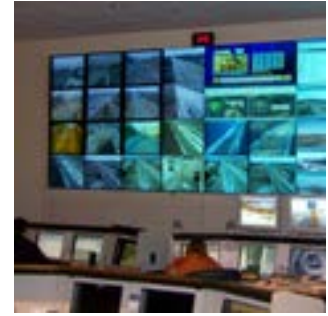
- + **Policy** – KYTC recently published a five-year [TSMO Business Plan](#).
- + **Urban** – OKI has recommended 11 corridors to be studied for TSMO implementations, including adaptive signals, cameras, shoulder pavement, smart lanes, and transit signal preemption.
- + **Rural** – KYTC has begun implementing capital projects such as adaptive signal system upgrades through the use of dedicated TSMO funding.



Traffic Operations Centers

Traffic Operations Centers (TOC) serve as hubs for remotely monitoring, detecting and responding to incidents that affect the transportation system, with the goals of reducing driver delays and improving efficiency.

- + **Urban and Rural** – KYTC operates a TOC in Frankfort that monitors traffic conditions and incidents throughout the state. GoKY.ky.gov is used to inform motorists of travel conditions throughout the state.
- + **Urban** – [TRIMARC](#) operates a TOC serving the Louisville and Northern Kentucky areas. TRIMARC uses cameras, dynamic message signs, and other tools to monitor traffic conditions and notify motorists regarding travel conditions. The City of Lexington also operates a TOC serving the metro area.



TEXT FROM FHWA CRP GUIDANCE ON PROJECT ELIGIBILITY

1. Projects that “establish or operate a traffic monitoring, management, and control facility or program”
2. Projects that use “advanced transportation and congestion management technologies”
3. Projects that deploy “infrastructure-based ITS capital improvements and the installation of vehicle-to-infrastructure communications equipment”
4. “Certain types of projects to improve traffic flow that are eligible under” CMAQ (and do not involve construction of new capacity)



6.5 ASSET MANAGEMENT

Asset Management includes activities associated with operating and maintaining the transportation system, such as highway and bridge maintenance as well as similar activities related to buildings and right-of-way. Innovative approaches to asset management and construction can reduce carbon emissions.



Energy Efficient Lighting and Traffic Control Devices

Replacing existing street lighting and traffic signals with energy-efficient alternatives reduces energy consumption and lowers emissions.

- + **Example** – KYTC recently replaced over 18,000 lighting fixtures with energy-efficient LED lights. The upgrades were estimated to reduce energy consumption by more than 50 percent and to save more than \$2.8 million a year in reduced utility and maintenance costs.



Electrification of State Vehicles

Replacing fleet and equipment vehicles with alternative fuel vehicles, including EVs, increases energy efficiency throughout the entire fleet and lowers carbon emissions.

- + **Example** – KYTC recently purchased four F-150 Ford Lightning Electric trucks. KYTC personnel use the vehicles for certain types of official state business and are evaluating them for additional KYTC uses.



Sustainable Pavements

Innovations in pavement design and construction have opened opportunities for reducing emissions using approaches such as Warm Mix Asphalt (WMA), Supplementary Cementitious Materials in Concrete, and Life-Cycle Assessments.

- + **Policy** – [KYTC Standard Specifications](#) allow for the use of alternate pavement designs and materials. KYTC's asset management efforts rely heavily on asset preservation techniques.
- + **Example** – WMA is manufactured at 100 degrees Fahrenheit less than typical Hot Mix Asphalt, reducing the fuel and emissions needed to produce the asphalt. KYTC is currently evaluating WMA.



Pollinator Habitat Zones

Restoring highway right-of-way to native vegetation reduces the need for mowing, lowers emissions from maintenance activities, and creates habitat for critical species needed for the pollination of agricultural crops. The increased vegetation also sequesters additional amounts of atmospheric carbon.

- + **Policy** – The Kentucky Department of Agriculture has published the [Kentucky Pollinator Protection Plan](#), for use by all state agencies.
- + **Example** – KYTC completed 55 pollinator plots in 2021, bringing the total number managed by KYTC to 125 plots covering 230 acres. KYTC plans to increase its total pollinator habitat acreage by 50 percent each year.



TEXT FROM FHWA CRP GUIDANCE ON PROJECT ELIGIBILITY

1. Projects “to replace street lighting and traffic control devices with energy-efficient alternatives”
2. Projects that “support the deployment of alternative fuel vehicles”
3. “Sustainable pavements technologies that reduce embodied carbon during the manufacture and/or construction of highway projects could be eligible”
4. “Alternative uses of highway right-of-way (ROW) that reduce transportation emissions are also eligible.” Examples include renewable energy generation facilities, such as solar arrays and wind turbines.

6.6 FREIGHT PROJECTS

Large volumes of freight move through Kentucky every day. This includes a large volume of local and long-distance truck traffic. Trucks generate several times the emissions per vehicle mile-traveled compared to automobiles. Freight's importance in Kentucky makes it a natural sector to target carbon-reduction efforts.



Truck Parking Electrification

The electrification of truck parking areas reduces emissions by decreasing truck idling while parked. Truck operators idle while parked for comfort and safety. By plugging in, drivers can heat/cool their cab and power appliances without running their engines.

- + **Policy** – These projects may involve partnerships with private truck parking providers. KYTC cannot charge for services at interstate truck parking facilities.
- + **Examples** – There are no public projects of this type in Kentucky, but there are several in other nearby states, including Ohio and Tennessee.



Truck Parking Information Management System Expansion

Truck Parking Information Management Systems (TPIMS) helps drivers identify where truck parking is available, increasing efficiency and reducing circulation time to find a parking space.

- + **Policy/Planning** – Kentucky has implemented TPIMS and is looking to upgrade and expand. KYTC is partnering with the Kentucky Transportation Center at the University of Kentucky to investigate new technologies. KYTC's Truck Parking Assessment and Action Plan identified priorities for the system expansion.
- + **Urban/Rural Examples** – Kentucky expects to expand and upgrade the TPIMS system in both rural and urban areas over the next six years. Specific projects are now being identified.



Hydrogen Powered Truck Refueling

Hydrogen refueling infrastructure can reduce emissions by encouraging shippers to convert to hydrogen-powered trucks.

- + **Examples** – The Energy and Environment Cabinet (EEC) is currently conducting a feasibility study to assess the potential of long-haul truck hydrogen refueling in Kentucky. Kentucky is also part of two Hydrogen Hub awards announced in October 2023.



Port Emissions Reductions / Electrification

Port electrification projects and other port projects that reduce energy use can lower carbon emissions.

- + **Examples** – Riverport electrification could include converting terminal tractors, day trucks, or other on-road vehicles to electric power. There are no known examples in Kentucky, but there are opportunities for future projects.



Truck Parking Supply

(Would Require Emissions Reduction Documentation)

Truck parking can reduce emissions by decreasing the time truck drivers circulate looking for parking. Per the CRP Guidance, truck parking shortages affect US supply chain efficiency and the safety of truck drivers and other roadway users.

- + **Policy/Planning** – Kentucky recently completed a [Truck Parking Assessment and Action Plan](#) that highlights where truck parking is most needed.
- + **Urban** – Two public truck parking areas in Northern Kentucky (Boone County) are being expanded. Design is currently underway.
- + **Rural** – Truck parking is being planned for the construction of a relocated weigh station on I-65 in rural central Kentucky.



TEXT FROM FHWA CRP GUIDANCE ON PROJECT ELIGIBILITY

1. “Advanced truck-stop electrification systems.”
2. Projects that reduce the “environmental and community impacts of freight movement.”
3. Projects that “support the deployment of alternative fuel vehicles.”
4. “Project that reduces transportation emissions at port facilities, including through the advancement of port electrification.”



6.7 OTHER

Several eligible and promising types of projects do not fit in any of the previous six categories.

Roadside Renewables

Installation of renewable energy sources along existing state-owned rights-of-way allows state agencies to increase energy independence and promote clean energy solutions. Examples include installing solar panels along state-owned roadways and wind turbines at rest areas.



- + **Policy** – FHWA has issued [guidance to DOTs](#) on leveraging alternative uses of highway right-of-way. This memo includes guidance for renewable energy facilities along roadways.
- + **Urban/Rural Examples** – There are no public projects of this type in Kentucky, but there are several in other states, including Pennsylvania and Oregon.

Carbon Sequestration

Carbon sequestration is the process of capturing and storing atmospheric carbon dioxide. There are two major types of carbon sequestration: geologic and biologic.



- + **Examples** – FHWA conducted a pilot project that explored the feasibility of state DOTs reducing and sequestering greenhouse gas (GHG) emissions in vegetation within highway rights-of-way (ROW).

Land Use-Transportation Projects

(May not be eligible, would require emissions reduction documentation)

New, planned communities and redeveloped corridors that incorporate traditional neighborhood form and establish connections and intersections at regular intervals allow residents to walk to amenities and activities in and outside of their neighborhoods.



- + **Urban Examples** – Nicholasville Road (Lexington), Broadway (Louisville).
- + **Rural Examples** – in 2023, KYTC launched a [transportation and land use planning program](#) for which communities under 200,000 persons are eligible. While most planning studies are not eligible, projects resulting from this effort may be eligible.

Rural Internet Connectivity

(May not be eligible, would require emissions reduction documentation)

Expanding broadband internet access to rural areas could improve energy efficiency, and reduce emissions, by allowing more residents to telecommute and convert vehicle trips for education, health services and commerce to online experiences.



- + **Policy** – In August of 2023, Kentucky completed the [Broadband Equity, Access, and Deployment \(BEAD\) Program](#), a five-year action plan to expand “last-mile” broadband access in Kentucky.
- + **Example** – KentuckyWired is a state-run project that constructed high-speed, high-capacity fiber optic cable to every county in Kentucky. KentuckyWired used some existing rights-of-way along KYTC roadways. The state is now expanding last-mile broadband access through the Office of Broadband Development.

TEXT FROM FHWA CRP GUIDANCE ON PROJECT ELIGIBILITY



1. Certain transportation alternatives projects (as defined prior to the FAST Act) including ... planning ... “on-road and off-road trail facilities for pedestrians, bicyclists, and other nonmotorized forms of transportation”
2. Project or strategy designed to support “shifting transportation demand to nonpeak hours or other transportation modes, increasing vehicle occupancy rates, or otherwise reducing demand for roads” ... including “travel demand management strategies and programs”
3. “Alternative uses of highway right-of-way (ROW) that reduce transportation emissions are also eligible ... and, biologic carbon sequestration practices along highway ROW to capture and store CO₂ may demonstrate potential for substantial long-term transportation emissions reduction”

Additional CRP Guidance:

Other projects “may be eligible for CRP funds if they can demonstrate reductions in transportation emissions over the project’s lifecycle ... projects to add general-purpose lane capacity for single occupant vehicle use will not be eligible absent analyses demonstrating emissions reductions over the project’s lifecycle.”

“States should work with the FHWA on eligibility questions for specific projects. The CMAQ Emissions Calculator Toolkit is an available resource for estimating the CO₂ emissions benefits of certain projects.”

In addition, “a State may use funds apportioned under CRP for any project eligible under the Surface Transportation Block Grant program (23 U.S.C 133(b)) if the Secretary certifies that the State has demonstrated a reduction in transportation emissions (1) as estimated on a per capita basis, and (2) as estimated on a per unit of economic output basis.”



7 FUTURE ACTIONS AND EVALUATIONS

KYTC has developed an action plan, a high-level project selection framework, and an evaluation plan to follow up on the creation of this Carbon Reduction Strategy. These elements form a high-level roadmap for how the strategic goals can be accomplished by delivering projects across the state for all Kentuckians.

7.1 CRS ACTION PLAN

The action steps needed to implement this strategy begin with education and move on to project selection and implementation, followed by program evaluation. They are summarized in **Table 6**.

TABLE 6 CRS ACTION PLAN

Timeframe	Action
2023 Q4	+ FHWA Approval of CRS
	+ Circulate CRS to MPOs, ADDs, and KYTC staff
2024	+ Coordinate with ADDs and MPOs to make sure that all FY 2022 and FY 2023 funding is assigned to eligible projects.
	+ Select new CRP Projects and program future year funding
	+ Consider new project types based on the CRS
2025	+ Select new CRP Projects and program future year funding
	+ Conduct a high-level review of program effectiveness
2026	+ Confirm that all CRP funding for the 5-year cycle is programmed
	+ Conduct a high-level review of program effectiveness
2027	+ Evaluate Program Effectiveness
	+ Prepare and Obtain FHWA Approval of 2027 CRS

KYTC will use three standing quarterly meetings (typically held on the same day) – MPO coordination meetings, State Transportation Planning Meetings, and Highway District Office (HDO) Meetings – to facilitate ongoing collaboration regarding the CRP and potential projects. Many of the agencies involved in programming these projects are already in attendance at these meetings, including KYTC, FHWA, MPOs, and ADDs. The meetings could include presentations on successful carbon-reducing projects as well as discussions regarding eligibility or new project types that are being funded and implemented.



7.2 PROJECT SELECTION FRAMEWORK

There are many types of projects that qualify for CRP funding. KYTC and MPOs should review this CRS to help identify projects and strategies that can improve the transportation system in Kentucky while reducing on-road carbon emissions. The projects selected will likely differ for each MPO and each part of the state. Three major questions to consider in project section:

1. Does the project reduce on-road carbon emissions?
2. Does the project accomplish the other CRS goals?
3. Is the project consistent with the needs of the local area or region?

Additionally, it is critical to evaluate project eligibility. Example project lists were provided in **chapter 6 Project Types and Strategies**. Information from the guidance was also provided at the end of each project category, identifying projects that are or may be eligible. The last page of the chapter presents details on the process for gaining additional flexibility for project approval from the USDOT Secretary. This process requires that emission reduction data be provided. Further guidance on this certification process is expected from USDOT.

Currently, there are a limited number of resources available for assessing the carbon reduction potential for all the projects that may be eligible. However, USDOT and other agencies continue to conduct research and new information is becoming available. As new information becomes available, it can be shared through the quarterly meetings referenced in the action plan.

7.3 EVALUATION PLAN

Evaluation of the success of the CRS will be conducted using five key metrics as listed in **Table 7**. These metrics can be tracked at a high level over the next several years, and then a more detailed examination can be completed for the CRS update in 2027. Per the program guidance, the program evaluation can be funded using CRP funds.

TABLE 7 CRS EVALUATION METRICS

No.	Metric	Description
1	Funds Obligated	CRP funds are obligated by year
2	Projects Completed	Number of projects completed by type and size of project
3	KY Travel	Annual vehicle miles traveled (VMT) (statewide, per capita, and county)
4	Project Level Emissions	Specific project-level emissions reductions (predicted or actual)
5	Disadvantaged Community Benefits	The above metrics will be assessed with respect to disadvantaged communities in the state.

As noted in evaluation metric five, to assess the effectiveness of the program in equitably serving all Kentuckians, which was an identified program goal, the above metrics will also be assessed with respect to disadvantaged communities in the state.

7.4 2027 CRS UPDATE

The above action plan, project selection framework, and evaluation metrics will support the preparation of the 2027 CRS update for Kentucky, which will be completed in accordance with any updated FHWA guidance regarding the program.



APPENDIX A: CRS REQUIREMENT CHECK

Level of Requirement	CRP Requirement	KYTC CRS Action	Beginning Page No.
Shall	Submit CRS to FHWA by 11/15/23	Submitted on 11/15/23	NA
Shall	Develop the CRS in consultation with MPOs	KYTC consulted with the MPOs during development of the CRS.	8
Encouraged	Integrate CRS with Statewide Plans	CRS refers to numerous statewide plans including the LRSTP. The CRS goals are primarily based on the LRSTP. LRSTP Update will refer to or incorporate CRS.	2, 29
Shall	Support efforts to reduce transportation emissions	Reducing emissions is the first project goal listed for the KY CRS. The CRS also highlights current CRP funded and non-CRP funded efforts to reduce transportation emissions in the state as well as potential future projects and project types to would reduce emissions.	3, 9, 15
Shall	Identify projects and strategies to reduce carbon emissions	CRS highlights current CRP funded and non-CRP funded efforts to reduce transportation emissions in the state as well as potential future projects and project types that would reduce emissions.	9, 15
May	Reduce traffic congestion by facilitating the use of alternatives to single-occupant vehicle trips, including public transportation facilities, pedestrian facilities, bicycle facilities, and shared or pooled vehicle trips	Providing Connectivity and Travel Options is the fourth project goal listed for the KY CRS. The CRS also highlights current CRP funded and non-CRP funded efforts to reduce congestion through the use of transportation alternatives in the state as well as potential future projects and project types that would reduce congestion.	3, 9, 18
May	Facilitate the use of vehicles or modes of travel that result in lower transportation emissions per person-mile traveled as compared to existing vehicles and modes	CRS highlights current CRP funded and non-CRP funded efforts to facilitate the use of vehicles or modes of travel that result in lower emissions in the state as well as potential future projects and project types that would facilitate the use of vehicles or modes of travel to reduce emissions.	9, 15



Level of Requirement	CRP Requirement	KYTC CRS Action	Beginning Page No.
May	Facilitate approaches to the construction of transportation assets that result in lower transportation emissions as compared to existing approaches	CRS highlights potential future projects and project types that would facilitate the construction of transportation assets that results in lower transportation emissions.	23
Shall	Be appropriate to the population density and context of the state and its MPOs	CRS highlights funding allocations for each MPO in the state, as well as the allocations for rural areas. KYTC consulted with each MPO during the development of the CRS. The Project Types and Strategies provides both rural and urban examples to provide context for every agency to identify potential projects.	5, 15



APPENDIX B: BIL AND CRP GUIDANCE

The CRP requirements and guidelines come from [2021 BIL](#) and the [2022 CRP Guidance](#) and are summarized below.

BIPARTISAN INFRASTRUCTURE LAW (BIL)

The Federal requirements outlined in BIL include the following:

1. **Program Establishment** – USDOT Secretary shall establish a carbon reduction program to reduce transportation emissions.
2. **Eligible Projects** – Funds may be obligated for projects to support the reduction of transportation emissions. Thirteen specific types of projects are listed. However, an additional section provides flexibility to fund additional projects if the USDOT Secretary certifies that the State has demonstrated a reduction in transportation emissions on a per capita basis and on a per unit of economic output basis. Thus, certain projects are automatically eligible, but others can be demonstrated as eligible.
3. **Carbon Reduction Strategy** – Requirements are provided for the development of a CRS within two years of the enactment of BIL (see section below).
4. **Funding and Suballocation** – The text stipulates the suballocation of funds within each state. This section also outlines the program requirements related to MPOs, coordination in urban areas that are not Transportation Management Areas (TMAs), and consultation in rural areas.
5. **Federal Share** – The Federal cost share for the program is defined. For most projects the Federal share would be 80 percent, though higher shares may be possible for certain Interstate and safety projects. A list of project types potentially eligible for 100 percent federal funding can be found in 23 U.S.C. 120(c)(1).

CRP IMPLEMENTATION GUIDANCE

The 2022 guidance document reaffirms the purpose and provides additional information on how to implement the program. This includes sections on Administration Priorities, Funding, Carbon Reduction Strategies, and Eligibility and Coordination Requirements.

1. **Administration Priorities** – This section highlights eight priority areas.
 - a. **Safety** – Prioritize safety in all projects and promote complete streets.
 - b. **Transit Flex** – Coordinate with the Federal Transit Agency to fund transit projects.
 - c. **Transferability Between FHWA Programs** – A portion of the CRP funds can be transferred to other apportioned programs, subject to limitations.
 - d. **Americans with Disabilities Act (ADA)** – CRP funds can be used for ADA related projects if they reduce emissions and ADA compliance is required.
 - e. **Equity** – Consider using CRP funded projects to address racial equity, workforce development, and economic development, and to remove barriers to opportunity. CRP projects can also support the Justice40 Initiative, which establishes a goal that at least 40 percent of the benefits



of federal investments in climate and clean energy infrastructure are distributed to disadvantaged communities.

- f. **Climate Change and Sustainability** – CRP funded projects should reduce carbon dioxide emissions. They can also 1) support fiscally responsible land use and transportation efficient design, 2) incorporate electrification or zero emission vehicle infrastructure, 3) support climate change resilience, and 4) address environmental justice concerns.
 - g. **Labor and Workforce** – Recipients should work with FHWA to identify opportunities for Federal-aid highway investments to advance high-quality job creation through the use of local or other geographic or economic hire provisions.
 - h. **Truck Parking** – CRP funds may be obligated for eligible truck parking projects that reduce transportation emissions, including truck stop electrification.
2. **Funding** – See guidance text and CRS Chapter 3.
 3. **Carbon Reduction Strategy** – See section below.
 4. **Eligibility and Coordination Requirements**
 - a. **General** – CRP funding may be used on a wide range of projects that support the reduction of transportation emissions. Projects must be identified in the Statewide Transportation Improvement Program (STIP)/Transportation Improvement Program (TIP) and be consistent with the Long-Range Statewide Transportation Plan and Metropolitan Transportation Plan(s).
 - b. **Program Evaluation** – States are encouraged to incorporate program evaluation from the outset of their program design and implementation to meaningfully document and measure their progress. Evaluation costs are allowable costs unless prohibited by statute or regulation.
 - c. **Eligible Activities** – Lists 13 specific project types and discusses additional flexibility. Projects that add general-purpose lane capacity for single occupant vehicle use will not be eligible absent analyses demonstrating emissions reductions over the project's lifecycle. Three additional project types are discussed. The topic of project types is discussed in detail later in the document.
 - d. **Flexibility on Use of Funds and Certification of Emissions Reduction** – CRP funds may be used for other projects if the USDOT Secretary certifies that the State has demonstrated a reduction in transportation emissions (1) as estimated on a per capita basis, and (2) as estimated on a per unit of economic output basis. The USDOT Secretary will not certify flexibility for the CRP until at least Fiscal Year (FY) 2023. FHWA will publish additional guidance on the process under which the USDOT Secretary will certify state transportation emissions reductions.
 - e. **Consultation and Coordination**
 - i. **Coordination in Urbanized Areas** – Before obligating funds in an urbanized area that is not a TMA, a State must coordinate with any MPO that represents the urbanized area.
 - ii. **Consultation in Rural Areas** – Before obligating funds in a rural area, a State must consult with any regional transportation planning organization or MPO that represents the rural area.
 - iii. **For Both Urban and Rural Areas Above** – The State and MPO must also use their documented public involvement processes, including their process for seeking out and considering the needs of those traditionally underserved by existing transportation systems.



CRS Requirements

Kentucky is required to develop a Carbon Reduction Strategy in consultation with the MPOs in the state and submit it to the Federal Highway Administration (FHWA) by November 15, 2023. The CRP guidance outlines several requirements for the CRS.

States, in coordination with MPOs, are encouraged to develop their Carbon Reduction Strategies as an integral part of their transportation planning processes, such as by integrating them into the State's Long-Range Statewide Transportation Plan (LRSTP), the MPO's Metropolitan Transportation Plan (MTP), or by developing a separate document which is incorporated by reference into the LRSTP and MTP.

The CRS shall:

1. Support efforts to reduce transportation emissions.
2. Identify projects and strategies to reduce carbon emissions, which may include projects and strategies for safe, reliable and cost-effective options:
 - a. to reduce traffic congestion by facilitating the use of alternatives to single-occupant vehicle trips, including public transportation facilities, pedestrian facilities, bicycle facilities, and shared or pooled vehicle trips.
 - b. to facilitate the use of vehicles or modes of travel that result in lower transportation emissions per person-mile traveled as compared to existing vehicles and modes; and
 - c. to facilitate approaches to the construction of transportation assets that result in lower transportation emissions as compared to existing approaches.
3. Support the reduction of transportation emissions.
4. Quantify the total carbon emissions from the production, transport, and use of materials used in the construction of transportation facilities (at the discretion of the state)
5. Be appropriate to the population density and context of the state and its MPOs.

TEAM
KENTUCKY[®]
TRANSPORTATION
CABINET

BETTERKY >
PLAN

