



MEMORANDUM

To: Transportation Committee
From: CMAP Staff
Date: Friday, July 26, 2024
Subject: Climate Action Plan for the Chicago MSA
Purpose: Provide update on the Climate Action Plan for the Chicago MSA
Action Requested: Discussion

CMAP seeks to update the Transportation Committee on the development of the Climate Action Plan for the Chicago MSA (CAP) by providing an overview of transportation sector emissions, and a preliminary exploration of decarbonization strategies and approaches. This memo provides a brief overview of the project and updates regarding stakeholder engagement, plan guiding principles, greenhouse gas inventory, and preliminary research on the transportation sector.

During the meeting, members will be engaged to understand where the region can lead, where to focus our efforts, and the biggest challenges associated with decarbonizing transportation. Members may prepare for the meeting by contemplating the following discussion questions:

- What decarbonization strategies are essential for this sector?
- What characteristics or assets could make the region a leader in decarbonizing the transportation sector?
- What are the greatest transportation decarbonization opportunities in the region? What are the greatest sector-specific challenges?
- What strategies have been proposed, are in progress, or are already happening in the region?
- What strategies should the region prioritize to achieve its net zero goal?

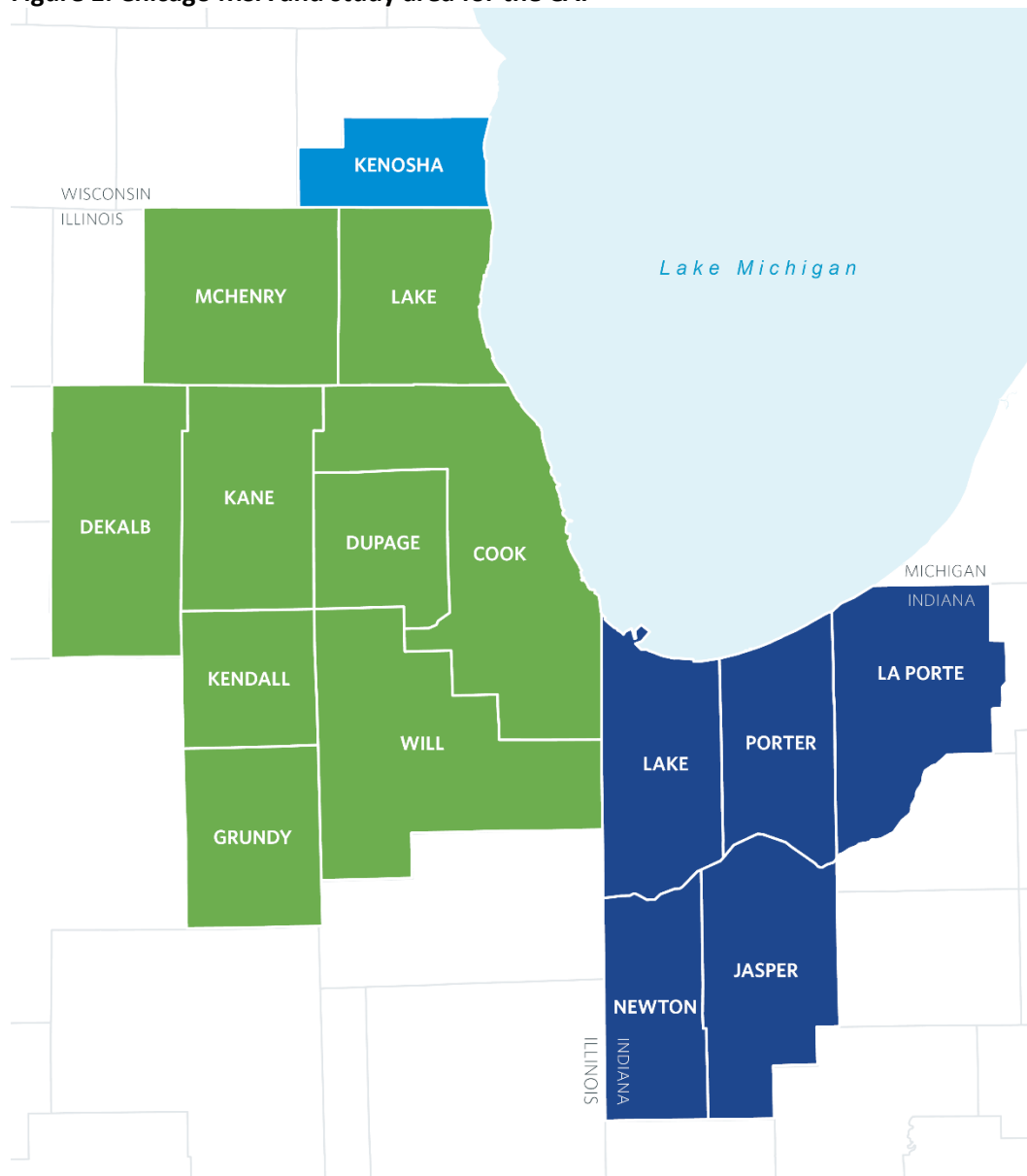
Project overview

The Metropolitan Mayors Caucus (MMC), CMAP, and Northwestern Indiana Regional Planning Commission (NIRPC) are partnering to update and expand existing regional climate mitigation plans to address greenhouse gas emissions and establish GHG reduction measures throughout the Chicago Metropolitan Statistical Area (MSA), including parts of Illinois, Indiana, and Wisconsin (Figure 1). The work is supported in part by a Climate Pollution Reduction Grant, a U.S. Environmental Protection Agency initiative to provide funding to states and metropolitan areas to develop and implement plans to reduce GHG emissions.

By July 2025, the CAP must engage a broad array of stakeholders, estimate the effectiveness of potential reduction measures, and lay out a strategy to address all significant GHG sources, sinks, and sectors. The overarching goal is to define the steps needed for the Chicago MSA to achieve the national goals of 50-52 percent below 2005 levels by 2030 and net-zero emissions no later than 2050. Per CRPG requirements, the CAP will identify GHG reduction targets and establish targets for each sector. It will

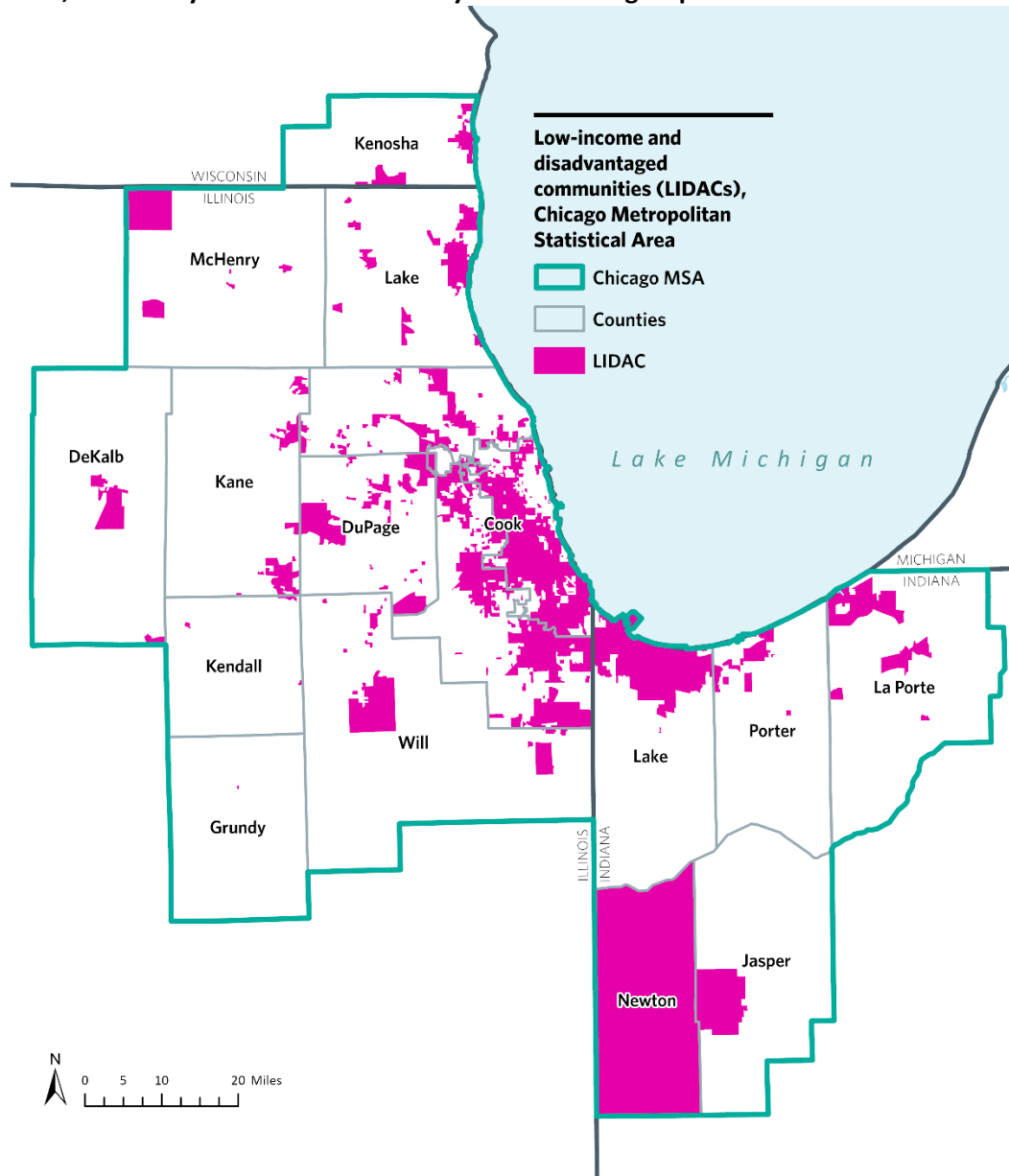
also assess the benefits that could be achieved through the reduction of criteria air pollutants as well as co-benefits to low income and disadvantaged communities that are marginalized, underserved, and overburdened by pollution (Figure 2).

Figure 1. Chicago MSA and study area for the CAP



Source: CMAP, 2024.

Figure 2. Low-income and disadvantaged communities in the Chicago metropolitan statistical area, defined by CEJST and EJScreen by census block groups



Source: CEJST, November 2022, and EJScreen, June 2023, via IRA Disadvantaged Communities Map.

Project updates

Since the March Transportation Committee meeting, the project team has made significant progress in the following areas and will provide an update at the August meeting.

Stakeholder engagement

CAP stakeholder engagement is structured to strengthen the plan and improve its chances for implementation. To accomplish these goals, CMAP will implement an outreach approach that includes a steering committee, three working groups, and several topical workshops, among other initiatives. Since the Climate Committee’s last meeting, CMAP has refined the stakeholder engagement approach and convened the steering committee and three working groups in June and July.

Steering committee. The steering committee includes regional implementers, subject matter experts, and leaders from impacted communities across the 15-county Chicago MSA. The steering committee held its first meeting on June 11, 2024, and will meet quarterly, between June 2024 and July 2025 to focus on plan development and implementation. Members will not vote on the plan. Rather, they will serve as resources to inform its development. Nine committee members will serve as representatives of the working groups and CMAP Climate Committee. More members will be invited to serve as representatives on the working groups, if interested.

Working groups. Supporting the steering committee’s work will be four working groups and a series of workshops – each with their own sector or stakeholder focus. It is CMAP’s intent that the working groups contain public and private implementers, subject matter experts, and equity champions. Together, they will be responsible for reviewing and proposing strategies, goals, and targets, sharing data and resources as needed, and providing guidance on sector-specific messaging. The working group’s efforts to craft reduction strategies will run parallel to one another as well as similar efforts in topical workshops on energy generation, freight, agriculture, and other ad hoc meetings. The three sector working groups held their first meetings in July. The CAP team has made progress on identifying members and roles for the equity working group, which will be convened later this summer.

Additionally, the NIRPC Environmental Management and Policy Committee, MMC Environment Committee, this Committee and CMAP’s Community Alliance for Regional Equity will be involved in proposing and considering mitigation strategies. The CAP team will continue to coordinate and collaborate with the States of Illinois, Indiana, and Wisconsin to minimize redundancies in outreach and maximize consistency in the analysis and conclusions of the respective plans.

The CAP transportation working group includes the following members, though additional perspectives may be added as the project advances:

Representative	Organization
Samantha Bingham	Chicago Department of Transportation
Jen Henry	Chicago Transit Authority
Querida Ellis	ComEd
Jesse Elam*	Cook County Department of Transportation and Highways
Carl Lisek	Drive Clean Indiana
Pastor Scott Onqué	Faith in Place
David Wright	Gary Public Transit Corporation
Elizabeth Irvin*	Illinois Department of Transportation
Erik Varela*	Illinois International Port District
Henry Guerriero II	Illinois Tollway
Kevin Carrier, Mike Klemens	Lake County Division of Transportation
Scott Hennings	McHenry Division of Transportation
Lynette Ciavarella	Metra
Charlotte Obodzinski	Pace Suburban Bus
Brian Urbaszewski	Respiratory Health Association

*Transportation working group member also serving on the CAP steering committee.

The transportation working group will also be contributing to a related project that CMAP has launched with ComEd and the Respiratory Health Association. As a recipient of a Clean Energy to Communities (C2C) In-Depth Technical Assistance contract funded by the Department of Energy and administered by the National Renewable Energy Laboratory (NREL), our region will receive technical assistance from Argonne and Oak Ridge National Laboratories to explore how the region can fully decarbonize the transportation sector by 2050 and its impacts on the electrical grid. This 3-year project will use a scenario planning exercise to better understand the types and scale of action needed to foster a clean energy transition.

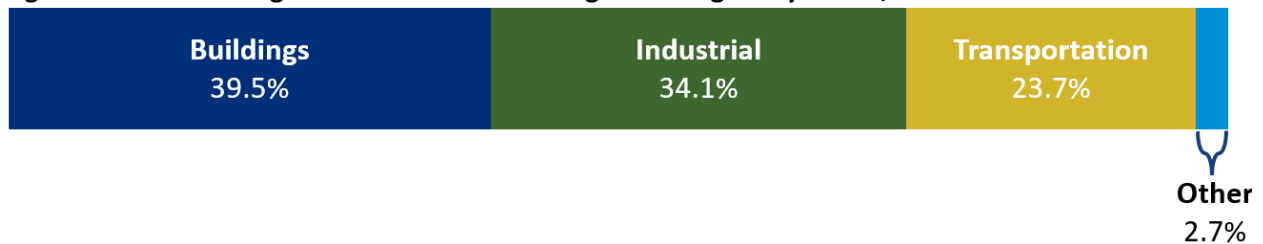
Greenhouse gas inventory

The process by which emission sources and sinks are identified and quantified within the planning geography is critical to the climate action planning process. A GHG inventory helps the region identify and assess GHG reduction measures, conduct benefit analyses, and both set and track progress toward emission reduction targets. The GHG inventory was developed in accordance with USEPA guidance through the development of the Priority Climate Action Plan and further refined for the CAP.

The 2020 Chicago MSA Greenhouse Gas Inventory¹ covers emissions from eight sectors: transportation, residential, commercial and institutional buildings, industrial, agriculture, waste, and wastewater. It also estimates carbon dioxide equivalent (CO2e) removed due to carbon sequestration of trees, forestlands, and wetlands within the region.²

In 2020, the 15 counties in the Chicago MSA produced approximately 168 million metric tons of carbon dioxide equivalent (MMT CO2e) of GHG emissions. Figure 3 provides the greenhouse gas emissions inventory for the Chicago MSA region, broken down by the following sectors: Buildings, industrial, transportation, and other. Carbon sequestration is estimated to reduce emissions by 2.86 MMT CO2e annually.

Figure 3. Greenhouse gas emissions in the Chicago MSA region by sector, 2020



Source: CMAP, 2024.

Transportation emissions sector overview

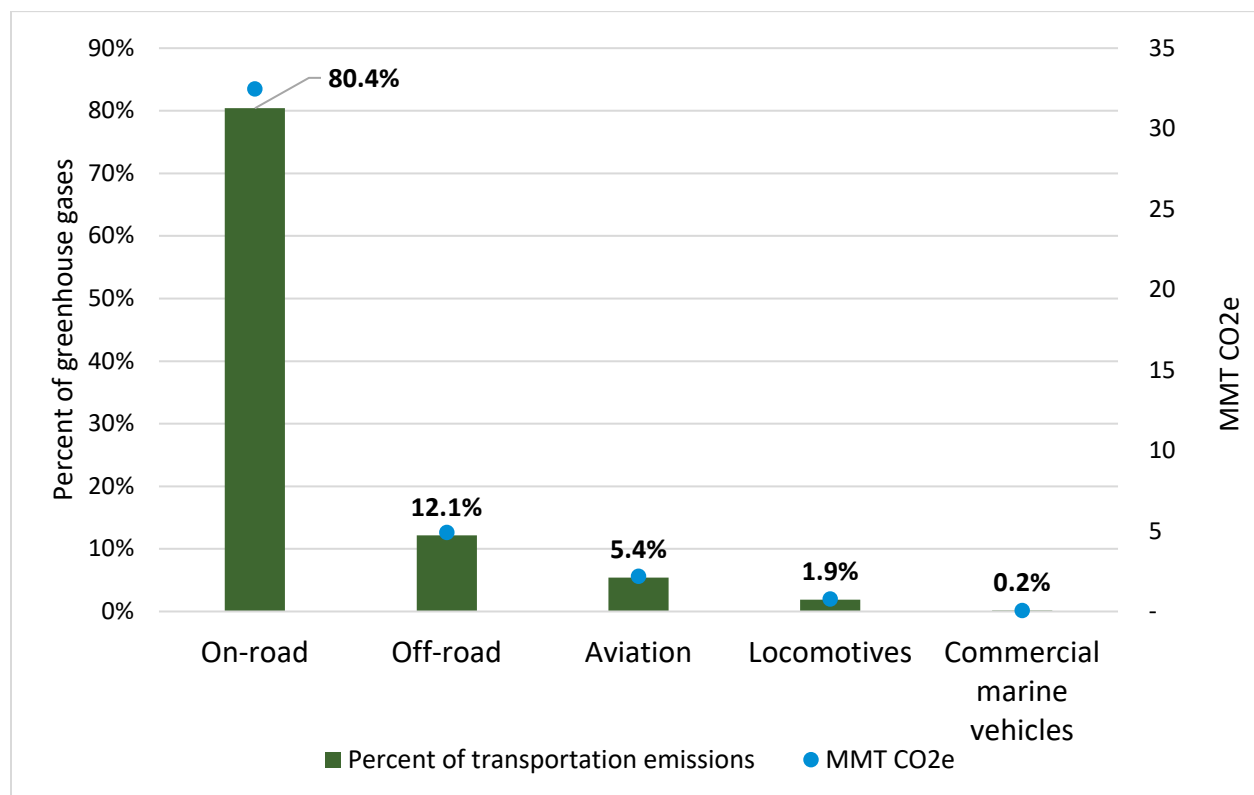
The transportation sector includes all mobile emission sources in the Chicago MSA region. Mobile emissions are produced when fuels are burned by mobile sources, including on-road vehicles, locomotives, aircraft, construction and agricultural equipment, and more. The sector represents five subsectors of mobile emissions: on-road, off-road, locomotives, commercial marine vessels, and aviation. Generally, passenger, freight, and other commercial activities occur within each transportation subsector. Although these activities occur on shared networks (e.g., the roadway system and the railway system), varying trip purposes and vehicle types cause distinct emissions impacts. Below are the definitions for each subsector:

- **On-road:** Emissions from vehicles on roads in the region; primarily cars, trucks, and buses consuming gasoline or diesel fuel.
- **Off-road:** Emissions from vehicles (e.g., golf carts, pleasure crafts) that do not travel on roadways or motorized equipment using fuels (e.g., lawncare equipment, snowblowers)
- **Locomotive:** Emissions from freight railroad operations, commuter lines, and passenger trains traveling in the region.³
- **Marine:** Emissions from commercial marine vessel diesel engines either underway or at ports.⁴
- **Aviation:** Emissions from aircrafts based on fuel consumption during landing, take-off, and on-site at aviation facilities within the MSA.

According to the 2020 GHG inventory for the Chicago MSA, the transportation sector accounts for 23.7 percent of total MSA GHG emissions, representing 40.4 million metric tons of carbon dioxide equivalent (MMT CO₂e). This makes the transportation sector the third highest emissions sector after the buildings (39.5 percent) and industrial (34.1 percent) sectors.

In the Chicago MSA, just over 80 percent of transportation emissions come from on-road vehicles such as cars and trucks. The remainder comes from off-road vehicles, aviation, locomotives, and commercial marine vessels (Figure 4).

Figure 4. Transportation emissions by subsector in the Chicago MSA, 2020

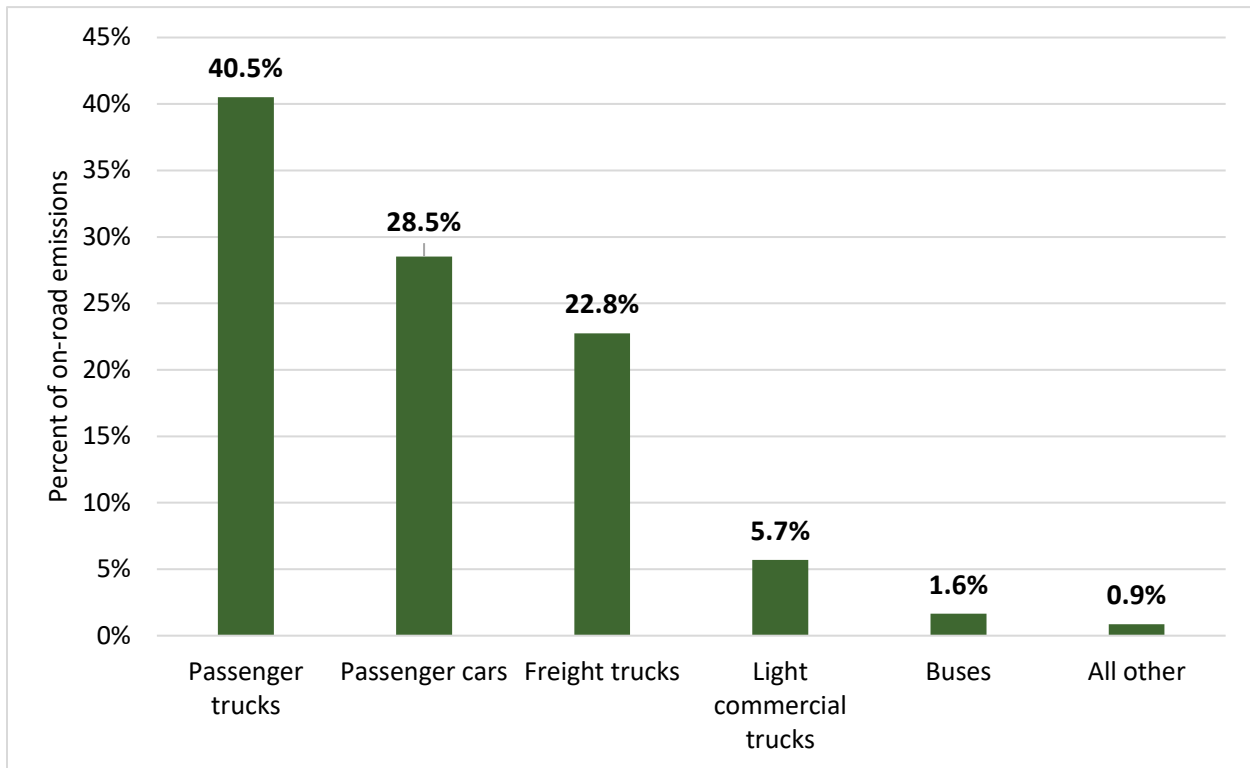


Source: CMAP, 2024.

On-road emissions are influenced by a vehicle’s efficiency and the number of vehicle miles traveled (VMT). While passenger vehicles have generally improved in terms of both emissions rates and fuel economy, they contribute to the majority of the vehicle miles traveled and therefore most emissions (Figure 5).

Passenger trucks include midsize and large sports utility vehicles (SUVs) and pickup trucks. In recent years, trucks have made up an increasing share of the new vehicle market both nationally and in the Chicago MSA, in response to a growing preference for larger vehicles. As a result, passenger trucks produce the most on-road GHG emissions of all vehicle types. While freight and commercial trucks contribute a relatively smaller portion of the total VMT, the energy required for freight vehicles to travel (energy intensity) coupled with the carbon intensity of diesel fuel mean that they have an outsized impact in terms of GHG emissions. When freight truck GHG emissions are evaluated by freight truck type, approximately half are from short-haul trucks, and the other half are from long-haul trucks.

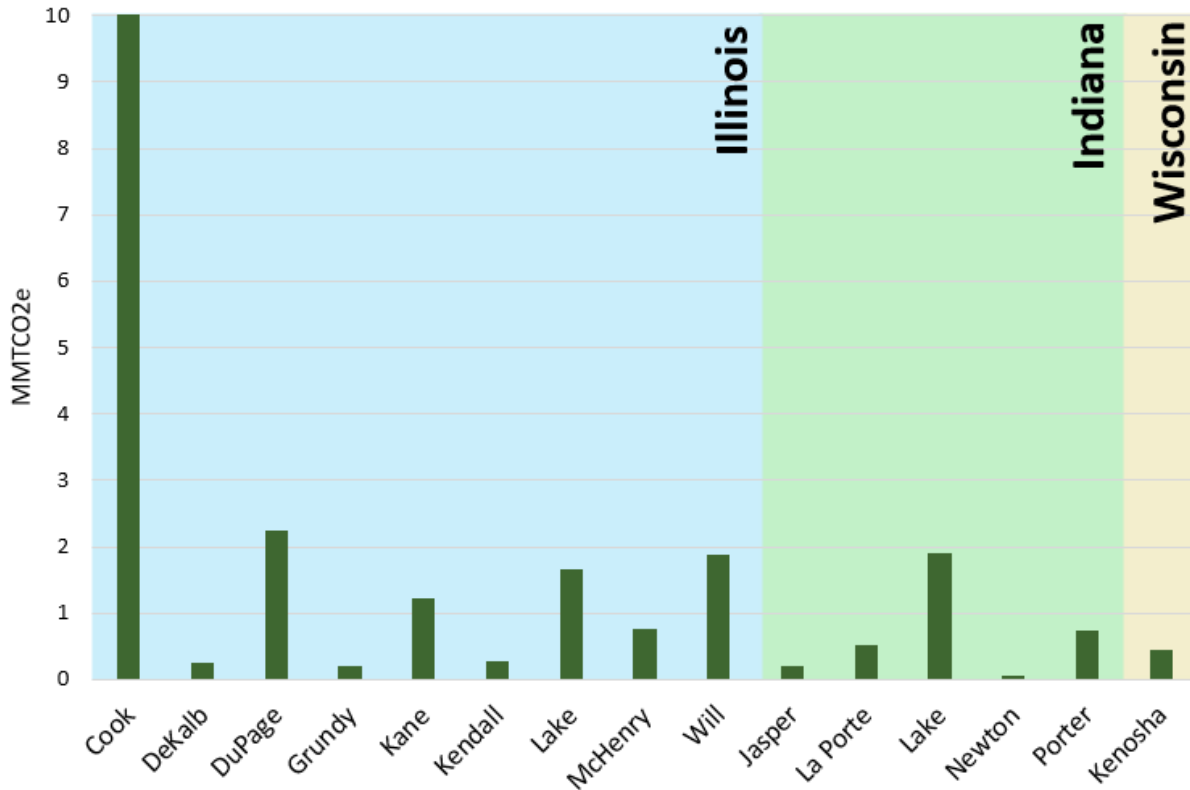
Figure 5. On-road emissions by vehicle type in the Chicago MSA, 2020



Notes: Passenger trucks include midsize and large SUVs and passenger pickup trucks. Passenger cars include sedans and small SUVs. Freight trucks include single-unit and combination short-haul and long-haul trucks. Light commercial trucks include midsize and large SUVs, vans, and pickup trucks used for commercial purposes. Buses include intercity, school, and transit buses. All other vehicles include motorcycles, motor homes, and refuse trucks. Source: CMAP, 2024.

Geographically, on-road emissions vary by county due to differences in development and travel patterns (Figure 6). For passenger emissions, Cook County is responsible for 45.7 percent of total emissions in the MSA; however, after accounting for population density, Cook County also ranks the lowest for per capita passenger emissions. Indiana counties have the highest per capita passenger emissions, but they contribute only 14 percent of the region’s total passenger-related emissions.⁵ These variations reveal the various trip types that occur across the region, with high numbers of shorter trips in the denser urban core as well as longer trips that originate in or pass through the less dense areas at the edges of the region.⁶ Approximately 75 percent of the region’s freight truck GHG emissions occur in Cook, DuPage, Will, Lake (IL), and Lake (IN) Counties. Of those counties, 43 percent of freight truck GHG emissions occur in Cook County alone.

Figure 6. Total passenger car/truck emissions by county in the Chicago MSA, 2020



Source: CMAP, 2024.

Other subsectors

These subsectors make up the remainder of transportation emissions with unique distributions across the MSA.

- Off-road emissions.** Construction (35.5 percent), industrial (23.3 percent), lawn and garden (18.6 percent), commercial (11.5 percent), and agricultural equipment (8.0 percent) comprise 96.9 percent of total off-road emissions. Off-road emissions are highest in the most populated counties with 63 percent emitted in Cook, DuPage, and Lake (IL). Agricultural equipment tends to make up a more significant portion of total off-road emissions in counties with lower populations.
- Aviation emissions.** Emissions from aviation are due to fuel consumption during landing, take-off, and on-site at eight airports throughout the region: Aurora Municipal Airport, DuPage Airport, Midway, O’Hare, Chicago Executive Airport, Waukegan National Airport, Kenosha Regional Airport, and Gary/Chicago International Airport. Nearly 80 percent of aviation emissions are associated with the three airports in Cook County.
- Locomotive emissions.** Approximately 73 percent of locomotive emissions come from freight travel and 27 percent from passenger travel, with most occurring in the counties of Cook, Will, and DuPage.
- Commercial marine vessel emissions.** Approximately 75 percent of these emissions are from vessels with C1 or C2-level engines that are underway (as opposed to emissions from vessels

while at ports).⁷ Nearly half of commercial marine vessel emissions occur in Cook County with an additional 19 percent occurring in Will County, 8 percent in Lake County (IL), 8 percent in Lake County (IN), and 7 percent in Porter County.

As the critical connector of homes and businesses, the transportation sector's emissions are influenced by and contribute to emissions in other sectors of our economy. Given the ongoing transition to electric vehicles (EVs), transportation sector emissions are projected to place higher demands on the electricity grid.⁸ Although EVs emit zero tailpipe GHGs, EV charging activities have emissions impacts depending on the source of power. Currently, the electricity supplying the Chicago MSA is generated from a variety of sources, with coal and natural gas used to create 64.4 percent of the total energy.

Activities in many freight-dependent industries related to manufacturing, construction, and retail trade have a direct influence on transportation sector emissions. Industries benefit from proximity to freight transportation infrastructure across modes and networks for regional, national, and global goods movement. For example, existing steel mills co-locate with ports, freight railways, and highways. Relatedly, the region's role as a freight transportation hub is reflected in associated commercial building emissions from warehousing and distribution centers. Overall, development patterns influence travel decisions and the corresponding emissions. For example, the location of a building has an impact on the region's emissions profile as it could change the length of a car trip or allow easy access to transit.

Community impacts and burdens

In addition to GHGs, other transportation sector emissions contribute to poor air quality and health outcomes, especially in historically disinvested, marginalized, and underserved communities. Exposure to air pollution causes a range of negative health outcomes including higher rates of asthma, cancers, heart disease, and more. These air pollutants include particulate matter (PM_{2.5} and PM₁₀), nitrogen oxides (NO_x), and volatile organic compounds (VOCs).⁹

Communities along highways and near warehouses, ports, airports, intermodal facilities, and rail yards are disproportionately exposed to transportation pollutants. Communities with significant freight activity are particularly exposed to poor air quality because of high levels of criteria air pollutants from medium and heavy-duty trucks. Because of redlining, racial covenants, land use, and other discriminatory policies, communities of color and people with low incomes tend to bear the brunt of transportation-related air pollution.¹⁰ Additional burdens imposed by the transportation system will be explored by the project team and working group in the future.

Key emissions drivers and national trends

Transportation emissions are influenced by several types of drivers, which are expected to change over time in ways that could either increase or decrease emissions:

- **Baseline regional conditions.** Regional conditions, such as population trends, amount of economic and freight activity, land use and development patterns, and the location of employment centers and remote work, all drive the demand for transportation and, therefore, have an impact on transportation emissions. Trips that pass through the region (e.g., long-distance road trips) may be independent of the baseline regional conditions.
- **Cost of travel.** Like the baseline regional conditions above, the cost of travel influences the demand for transportation and, therefore, impacts the level of transportation emissions. The cost of travel is primarily associated with the cost of fuel, but this category encompasses all of

the out-of-pocket costs associated with travel, such as the tolls, transit fares, e-bike incentives, the cost to own and maintain a personal vehicle, or the cost and convenience (in terms of lost or gained time) to use a particular mode.

- **Technology.** Technological changes and advances in the transportation sector are likely to impact future transportation emissions. Vehicle electrification and the increased adoption of alternative fuel vehicles are likely to reduce transportation emissions, but the rate of adoption by consumers and fleet vehicle replacement cycles will ultimately determine the rate of decarbonization. Advances in fuel efficiency, spurred in part by federal regulations, also influence transportation emissions. The impact of autonomous and connected vehicles on transportation emissions is unclear and needs further research.
- **National and international goods movement.** The Chicago region is a historic freight hub for North America,¹¹ and there are projections that freight activity will increase significantly in the coming decades.¹² The emissions associated with freight (beyond the amount of freight activity) are primarily driven by the mode of travel and the weight of cargo.
- **Changing climate conditions.** More frequent and extreme weather events (e.g., severe heat and precipitation) put increased stress on existing transportation and other public infrastructure. Extreme weather could change travel preferences and deteriorate the condition of transportation facilities, leading to changes in travel demand and congestion that increase emissions.

Transportation emissions at the national level are a slightly higher proportion than transportation emissions in the Chicago MSA. In the U.S., transportation emissions account for 28 percent of GHG emissions. Nationally, transportation emissions have been steadily increasing since 1990. According to USEPA, total transportation emissions have increased by 19 percent since 1990. This increase has been driven by the growth in VMT, counteracting the vehicle fuel economy improvements seen since 2005. From 1990 to 2022, passenger cars and light-duty trucks have increased the number of annual VMT by 47 percent.¹³ Growth in VMT can be contributed to several factors, including population growth, economic growth, development patterns, and low fuel prices. Within the 7-county area of CMAP's jurisdiction, transportation emissions have increased 2 percent between 2010 and 2019.¹⁴

According to the USEPA Automotive Trends Report,¹⁵ the emissions impact and fuel economy of new vehicles has improved significantly in recent years. However, the growing market preference for larger vehicles and trend away from sedans/wagons (with relatively higher fuel economy and lower emissions) has offset any emissions reduction benefits from improvements across vehicle types.

The DOE's 2022 Blueprint for Transportation Decarbonization includes a business-as-usual projection that sheds light on future VMT trends. Developed by the U.S. Energy Information Administration, these projections show a rebound to pre-pandemic levels and continued increases in VMT for both light and heavy-duty vehicles.¹⁶ For passenger cars, per-capita miles traveled are anticipated to remain stable; the growth in this subsector is driven by population growth (more people = more cars). Projections for economic growth, and corresponding assumptions about freight demand, could result in a 50 percent increase in heavy-duty vehicle travel by 2050. However, in the CMAP region, the volume of "lifts" (the movement of an intermodal unit) in 2023 totaled approximately 6.95 million, lower than in 2022 (7.38 million) and lower than the pre-pandemic high in 2018 (8.22 million). This runs counter to projected freight activity growth and requires more study. In addition, nationally, freight rail demand is expected to grow and air travel is expected to almost double by 2050. Domestic maritime operations are expected to decline slightly under current technology and regulations.

¹ Pandemic-related changes in transportation and energy consumption make 2020 an anomalous year for some datasets, but it is still a viable year for this analysis. The inventory is built using modeled and reported data from various time scales and geographies, which reduces the impacts of short-term fluctuations, such as those experienced in 2020. The inventory results are comparable to past efforts to study emissions in the region.

² Additional emission sources carbon sinks will be explored during the CAP development process.

³ Rail carriers are categorized into three classes, based on annual operating revenues. Class I carriers have the highest revenue threshold (over \$1.032 billion). The Chicago region is served by all six Class I railroads. More information on Surface Transportation Board rail classes can be found here: <https://www.stb.gov/reports-data/economic-data/>.

⁴ Marine diesel engines are separated into three categories based on their power: Category 1 (C1), Category 2 (C2), and Category 3 (C3). C1 and C2 engines provide propulsion to vessels such as tugboats, tow boats, supply vessels, and other commercial vessels in and around ports. C3 engines are the largest engines, usually for ocean-going vessels. The GHG emissions inventory includes emissions from both main and auxiliary engines.

⁵ Note that per capita transportation emissions rates may be misleading in rural areas where transportation activity is high and population density is low. This is because many of these trips may be pass through trips that are not pursued by the area's residents. Similarly, per capita transportation emissions do not reflect the origin, destination, or purpose of trips, which are important components to understanding why transportation emissions are occurring and how they could be mitigated.

⁶ Mobile emissions are assigned at the link level, which means that transportation activity that occurs within a particular county is assigned to that county. For example, if a trip occurs in both Cook & DuPage counties, the emissions from the trip would be distributed to both counties. The origin county will always include some additional emissions due to the emissions that occur when a vehicle is first turned on.

⁷ Examples of commercial marine vessels with C1 or C2-level engines include tugboats, towboats, supply vessels, and fishing vessels. These are smaller than vessels with C3-level engines, which are usually used on ocean-going vessels.

⁸ EV emissions associated with charging are currently in the building sector in the 2020 GHG inventory.

⁹ U.S. Department of Energy (DOE) et al., "The U.S. National Blueprint for Transportation Decarbonization: A Joint Strategy to Transform Transportation," 29, January 2023, <https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf>.

¹⁰ The Urban Institute, "The Polluted Life Near the Highway," November 2022, <https://www.urban.org/sites/default/files/2022-11/The%20Polluted%20Life%20Near%20the%20Highway.pdf>.

¹¹ Chicago Metropolitan Agency for Planning, "ON TO 2050," October 2018, <https://cmap.illinois.gov/regional-plan/goals/recommendation/maintain-the-regions-status-as-north-americas-freight-hub/>.

¹² Illinois Department of Transportation, "Illinois 2023 State Freight Plan," 11, December 2023, <https://idot.illinois.gov/content/dam/soi/en/web/idot/documents/transportation-system/reports/opp/freight/Illinois%202023%20State%20Freight%20Plan.pdf>.

¹³ U.S. Environmental Protection Agency, "Inventory of U.S. Greenhouse Gas Emissions and Sinks," April 11, 2024, accessed June 28, 2024, <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>.

¹⁴ Chicago Metropolitan Agency for Planning, "Greenhouse gas emissions in northeastern Illinois," accessed June 28, 2024, <https://cmap.illinois.gov/data/environmental/greenhouse-gas-emissions/>.

¹⁵ U.S. Environmental Protection Agency, "The 2023 EPA Automotive Trends Report," December 2023, <https://www.epa.gov/automotive-trends>.

¹⁶ U.S. Department of Energy, et al., "The U.S. National Blueprint for Transportation Decarbonization: A Joint Strategy to Transform Transportation," 28-33, January 2023, <https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf>.