CAMBRIDGE SYSTEMATICS

Southwest Industrial Corridors Transportation Study

final

report

prepared for

Chicago Department of Transportation

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List of Acronyms

Acronym	Description
ACS	American Community Survey
APC	Air Pollution Control
AQHI	Air Quality and Health Index
AQZO	Air Quality Zoning Ordinance
BACP	Chicago Department of Business Affairs and Consumer Protection
CARB	California Air Resources Board
CBA	Community Benefits Agreement
CDOT	Chicago Department of Transportation
CDPD	Chicago Department of Planning and Development
CDPH	Chicago Department of Public Health
CFR	Code of Federal Regulations
CIA	Cumulative Impacts Assessment
CIO	Cumulative Impact Ordinance
CMAP	Chicago Metropolitan Agency for Planning
CMAQ	Congestion Mitigation and Air Quality Program
CNT	Center for Neighborhood Technology
CO	Carbon Monoxide
ComEd	Commonwealth Edison
CPD	Chicago Police Department
DSS	Chicago Department of Streets and Sanitation
DZEC	Driving Zero Emissions Communities
EC	Elemental Carbon
EPA	United States Environmental Protection Agency
EV	Electric Vehicle
HUD	United States Department of Housing and Urban Development
IBZ	Industrial Business Zones

Acronym	Description
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
IIJA	Infrastructure Investment and Jobs Act
Pb	Lead
PM	Particulate Matter
NAAPME	Nonattainment Area Air Pollution Mitigation Enterprise
NAAQS	National Ambient Air Quality Standards
NESCAUM	Northeast States for Coordinated Air Use Management
NIOSH	National Institute for Occupational Safety and Health
NO_x	Nitrogen Oxide
NO_2	Nitrogen Dioxide
O_3	Ozone
OC	Organic Compounds
OEM	Original Equipment Manufacturer
PBOT	Portland Bureau of Transportation
RTA	Regional Transportation Authority
SCAQMD	South Coast Air Quality Management District
SIP	State Implementation Plans
SO_2	Sulfur Dioxide
SWICTS	Southwest Industrial Corridor Transportation Study
TEN	Transportation Equity Network
TIP	Transportation Improvement Program
TNC	Transportation Network Company
VOC	Volatile Organic Compounds
USDOT	United States Department of Transportation
WAIRE	Warehouse Actions and Investments to Reduce Emissions

Executive Summary

The Chicago region is the third largest economy in the US (larger than all but 20 countries of the world) and the largest rail/truck intermodal port in the country. While planners and transportation professionals often think of freight in terms of big numbers using economic statistics in the millions, billions, and trillions, freight's impacts are often most visible at the human scale: the trucks that use the streets every day. Trucks of all types and sizes operate at all hours throughout Chicago, and have a direct impact on the health, safety, and well-being of neighborhoods and residents beyond the economic statistics. On an annual basis, more than 400 people in Illinois will die and thousands more become sick due to pollution from diesel trucks.[1] People and communities also suffer from traffic congestion, safety concerns, and other negative impacts of trucks.

Yet as 1.7 million jobs and $227 billion in Chicago's gross regional product are tied to the extraction, manufacture, sale, and movement of goods, Chicago's economy is inexorably tied to freight – specifically trucks. While the Covid-19 pandemic initially brought a brief lull in overall traffic, the subsequent rapid growth of e-commerce meant that single unit truck counts, including delivery trucks, reached their pre-Covid levels within 3 months of the start of pandemic restrictions in 2020, and were 20 percent higher than pre-pandemic levels by January 2023, contributing to the region resuming its place among the most congested in the nation.[2] This growing trend of goods shipped directly to consumers is one factor contributing to the truck-related issues that continue to be prominent throughout Chicago and the broader region.

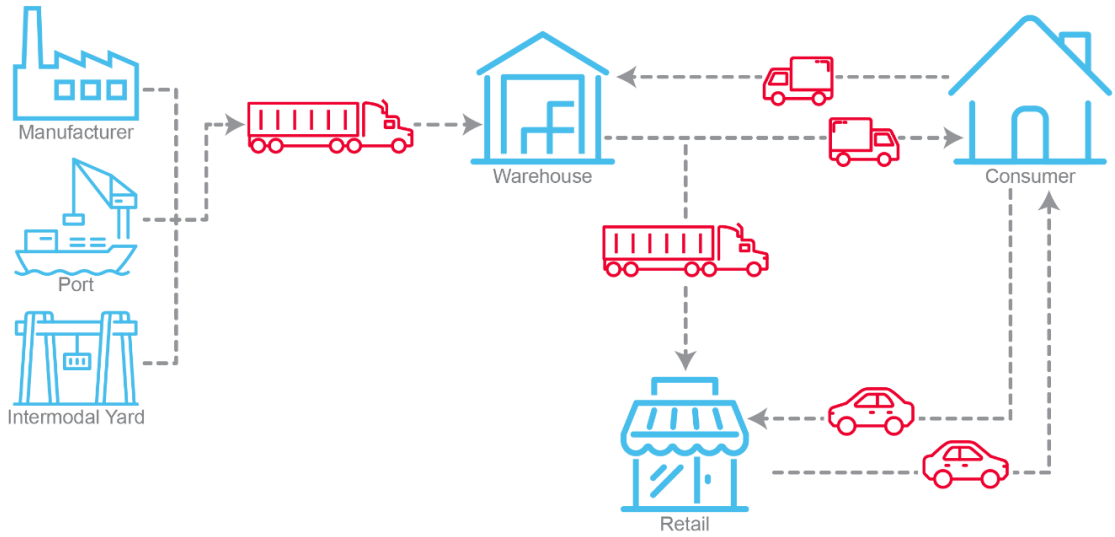
Figure 1 shows the critical – and diverse – roles that trucks play in modern supply chains for consumer goods. The grey arrows represent trucks and other vehicles moving goods between different points along the supply chain, from manufacturing and warehousing to retail spaces to the end consumer—and sometimes again in reverse, due to customer returns or exchanges.

While demand for freight and trucks will continue to grow, steps can and should be taken to better understand and reduce the impacts of trucks on communities. This study intends to articulate the impacts of trucks on the local scale, develop a general framework for identifying and addressing these local impacts, and identify potential opportunities for improving conditions for Chicagoans—particularly in and around the City's Southwest Industrial Corridor.

[1] https://chicago.suntimes.com/2022/5/29/23144783/diesel-truck-pollution-costs-lives-in-illinois-environment.

[2] https://www.dailyherald.com/news/20230110/bumper-to-bumper-chicago-area-ranked-worst-in-the-nation-for-traffic-congestion-

Figure 1. Trucks Are the Key Link in Modern Consumer Goods Supply Chains



Source: Cambridge Systematics

Truck impacts in communities are both tangible and perceived, and include:

- **Transportation impacts**, such as increased traffic congestion and reduced mobility, comfort, and convenience for people driving, taking transit, walking, bicycling, and using micro-mobility vehicles. Trucks also have greater size and inertia relative to other vehicles on the road, which create real and perceived safety risks, and impact pavement and bridge conditions.

- **Health impacts** from emissions, reduced air quality, and noise. Air pollution from trucks, including exhaust and particulate matter from tires and brake pads, contribute to respiratory issues and are correlated with higher incidences of heart and lung disease.

- **Community impacts** affecting quality of life, including noise and vibration from heavy vehicles. Community stakeholders have stated that the presence of truck traffic and freight facilities may limit other economic development opportunities, while the air quality and safety risks associated with trucks discourage more desirable activity on neighborhood streets.

Addressing truck impacts in communities is complex. Responsibilities and authority to act are often distributed among a variety of public institutions and private actors. Land use and equity issues are also conjoined and exacerbated by trucks. Economically vulnerable communities are home to a disproportionate share of freight facilities and high levels of truck traffic, but often have less access to resources to address these challenges than other communities. Freight-sector jobs, such as warehousing, are statistically more dangerous than other jobs that do not

require post-secondary education[3] and are often low-wage positions. Low wages, compounded by low employment density may limit the positive economic impacts of these types of activities. Communities with high truck impacts often perceive that their needs are not being addressed in comparison to other communities while being burdened with issues such as lower air quality and health outcomes.[4] Public agencies also struggle with limited resources for monitoring these impacts and outcomes and enforcing existing regulations that regulate or limit truck activity. Existing regulations and monitoring are limited in their ability to capture localized and cumulative impacts.

In general, governmental organizations and policy makers can use three types of strategies to help address the adverse impacts of trucks. These are as follows:

- **Source Removal:** Eliminate the negative impacts by removing the cause of the impacts (trucks) from the affected areas.
- **Source Reduction:** Reduce the rate at which the negative impacts occur by reducing the intensity or volume of externalities produced by trucks.
- **Source Repair:** Reduce the harm caused by the negative impacts by using tools that counteract or remove the externalities produced by trucks once those impacts have been generated.

A two-axis classification framework (**Figure 2**) may also be helpful to categorize different strategies available to policy makers and to help determine how changes may be designed and implemented.

One axis shows a spectrum between mitigation and transformation. Mitigation activities reduce the impacts of a negative externality (e.g., air pollution, noise, or safety risks caused by truck traffic) without changing the causes of these externalities. An example of mitigation could be the installation of pollution reduction devices, or “scrubbers”, in power plant exhaust systems to remove pollutants such as sulfur dioxide (SO_2) from the exhaust streams. Transformation activities would reduce the negative externality by removing or changing the source of that externality. Replacing coal-fired power plants with wind or solar power would represent an act of transformation, as that would eliminate the process of coal combustion and thus eliminate the SO_2 emissions source.

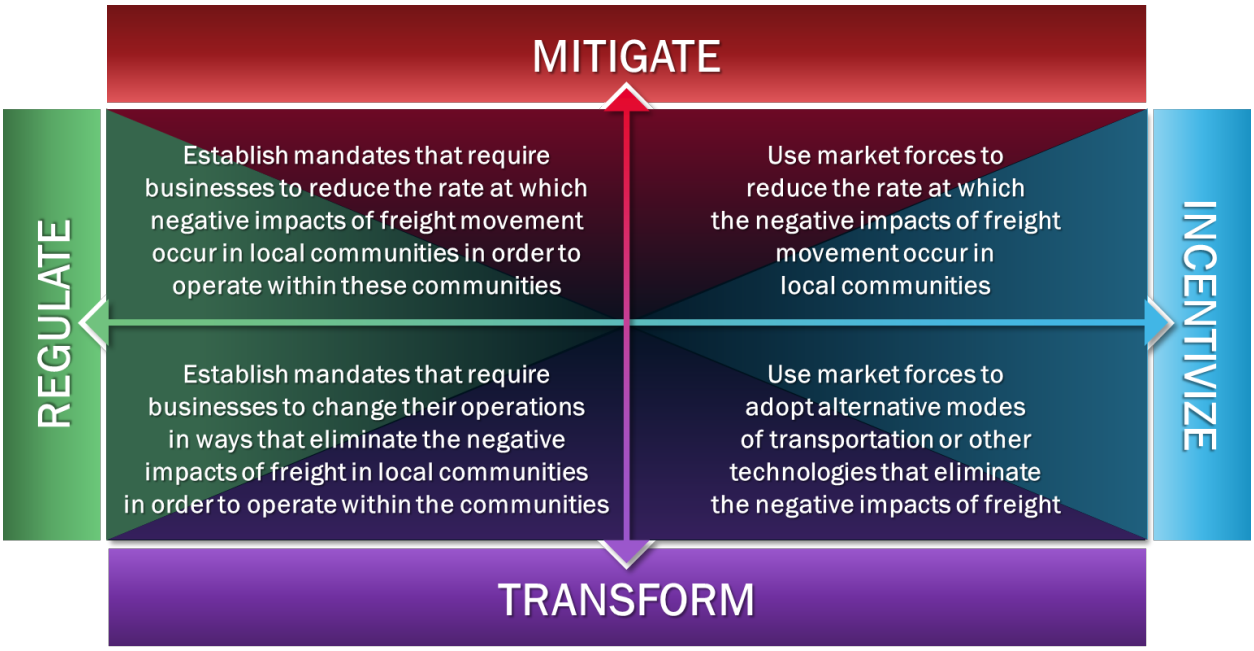
The other axis represents a spectrum between using regulatory powers and incentives, both positive and negative. Regulatory power sets rules and requirements other actors must follow in order to engage in a particular activity. An example of regulatory action is the set of local and

[3] In 2021, warehousing and storage jobs had an injury and illness rate of 5.5 incidents per 100 full-time workers, compared to 5.2 for hospitals, 4.9 for grocery stores, 4.3 for beverage manufacturing, etc. Bureau of Labor Statistics, 2021.

[4] https://www.chicago.gov/content/dam/city/depts/cdph/statistics_and_reports/Air_Quality_Health_doc_FINALv4.pdf)

state laws that restrict smoking in certain areas to reduce the impacts of secondhand smoke. These smoking bans are enforced by public agencies to ensure compliance, with fines levied on violators. Conversely, incentives rely on market forces by changing the costs associated with different operating conditions, tools, or technologies, encouraging actors to adopt them independently in response to changes in costs or benefits. Cigarette taxes are an example of a negative incentive that have been implemented by many governments to reduce smoking by making it more expensive.

Figure 2. Classification Framework for Strategies to Address Adverse Truck Impacts



There are potential opportunities for the City to take action on its own or in coordination with other entities to help mitigate or reduce truck impacts over the short to long term. **Figure 3** and **Table 1**, show key potential opportunities that have been identified by this study through a combination of best practices review, input from elected officials, focused discussions with community groups and residents, and analysis of existing and planned programs. In Figure 3, the size of each circle represents the potential effectiveness that the opportunity may have in addressing the adverse impacts of trucks. The practical effectiveness of any opportunity will be dependent on numerous factors, including agency resources, program or policy design, implementation timeframe, and others.

Figure 3. Potential Opportunities to Address Negative Impacts of Trucks

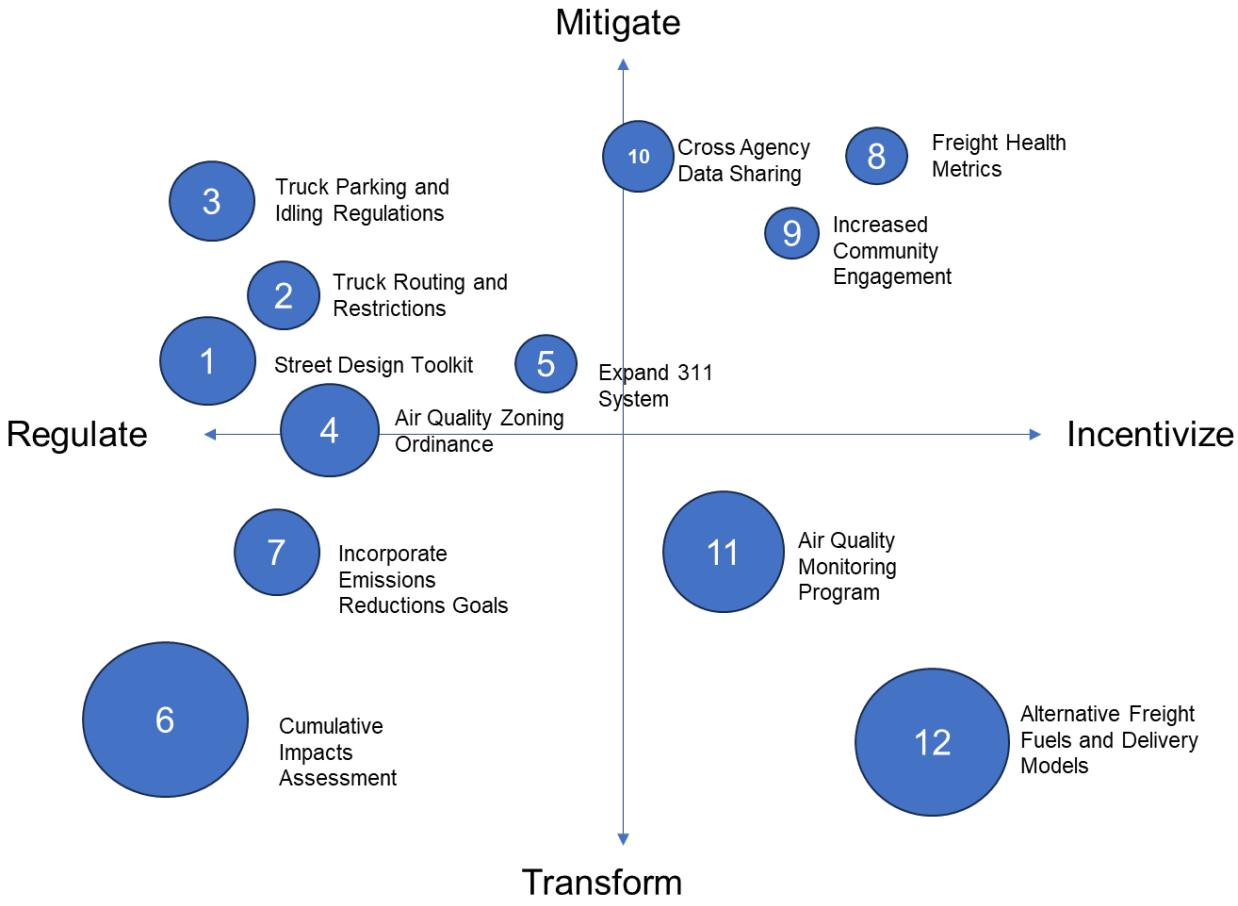


Table 1 Potential Opportunities to Reduce Negative Impacts of Trucks

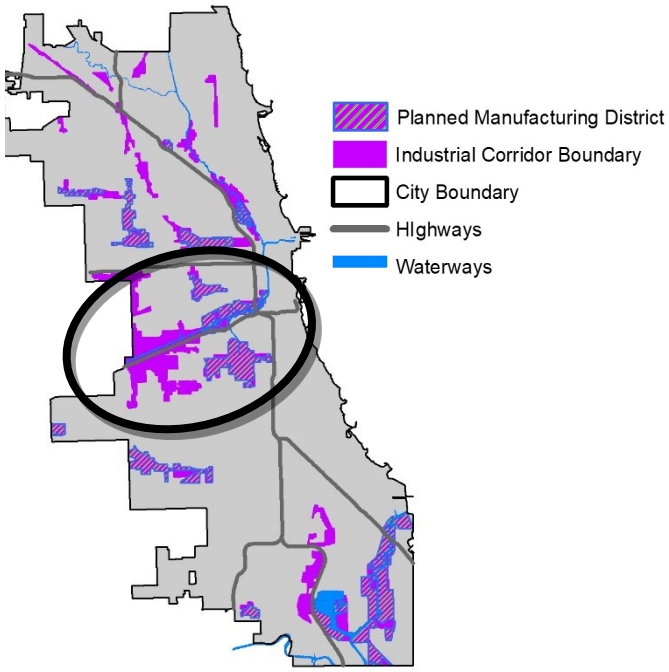
#	Potential Opportunity	Objective	Timeframe
1	Freight-Impact Reducing Street Design	Implement street design policies that accommodate trucks where necessary in ways that minimize impacts on other road users	Medium-Long: Overall process is medium- to long-term, but can be initiated quickly
2	Truck Routing and Restrictions	Discourage unnecessary truck activity in areas that are not well suited for it	Short: Opportunity focuses on increasing use of existing policies and programs
3	Truck Parking and Idling	Improve air quality, safety and congestion by enforcing truck parking and idling restrictions in areas that are not well suited for it	Short – Medium: Opportunity focuses on increasing use of existing policies with new elements
4	Air Quality Zoning Ordinance (AQZO) and Sustainable Development Policies	Measure and regulate the construction and expansion of facilities that generate truck trips	Ongoing-Long: AQZO is newly implemented; will be important to track outcomes over time and consider adjustments, if needed
5	311 System	Enhance the system to allow for truck-related complaints	Short - Medium: Action can be taken quickly, but will require inter-agency coordination
6	Cumulative Impacts Assessment	Use environmental metrics and targets/thresholds to limit future impacts and/or reduce overall impacts, particularly in environmentally overburdened and historically underserved communities	Ongoing-Long: Process to establish assessment is completed, deployment and implementation outcomes along with CIO development will be long-term processes
7	Emissions Reduction Goals in Transportation Planning and Programming	Use transportation investments, policies, and programs to support emissions reduction and air quality goals	Long: Development of a city-wide framework for incorporation of emissions reduction into decision making will require high-level buy-in and investment, similar to programs such as the Cumulative Impacts or Air Quality Zoning Ordinances
8	Freight Health Metrics	Identify and track metrics of the health impacts of freight	Medium-Long: Opportunity may be incorporated into deployment of Cumulative Impacts Ordinance, or could be undertaken as a stand-alone process
9	Community Engagement	Expand resources for information-sharing with community organizations and develop	Short – Long: Some improvements to the engagement process can be incorporated quickly, but

#	Potential Opportunity	Objective	Timeframe
		community engagement practices aligned with community needs and preferences	long-term outcomes will require culture and policy change at the Agency and/or City level
10	Cross-Agency Data Sharing	Increase availability and use of data to inform planning and decision making on issues impacting freight and communities	Short-Medium: Initial data sharing can begin immediately while development of a program and dashboard is underway
11	Air Quality Monitoring	Implement the Partnership for Healthy Cities Air Quality Monitoring Plan implementation strategies	Medium: Opportunity requires expanded deployment of various technologies and community coordination
12	Alternative Freight Fuels and Delivery Models	Support and accelerate programs that promote cleaner freight solutions to reduce adverse environmental impacts of freight movement	Ongoing – Medium: Actions are already underway; it will be important to continue to monitor program effectiveness and modify/advance over time

1.0 Overview of the Southwest Industrial Corridors Transportation Study (SWICTS)

This report presents the findings of the Southwest Industrial Corridors Transportation Study (SWICTS). This collaborative study was commissioned by the Chicago Department of Transportation (CDOT) and involved partner organizations including the Chicago Department of Planning and Development (CDPD), the Chicago Department of Public Health (CDPH), and the Regional Transportation Authority (RTA). The study area for SWICTS is within the oval marked in **Figure 4**.

Figure 4. SWICTS Study Area



The primary focus area of SWICTS is the Southwest Side of Chicago, but the study's findings may be applicable to neighborhoods throughout the City and region that experience similar impacts and challenges. The focus of the study is around the impacts caused by trucks, which are the most prevalent vehicle for transporting freight, and the most likely to cause and be perceived to cause negative impacts in local communities.

The purpose of SWICTS is to:

- Understand the negative impacts that freight imposes on the City's local communities and transportation systems while recognizing and supporting the critical role that freight plays in Chicago's economy.
- Develop a framework for addressing the negative impacts of trucks within communities.
- Identify existing and potential strategies that the City and its partners can use to address these negative impacts in the short and long term.

The report explores these three topics. The framework developed in this study is designed to be holistic, examining root causes and impacts of freight, rather than assessing the details of specific activities or developments. Moreover, this study is intended to help support both short- and long-term potential actions to address the negative impacts of trucks, including additional research and identification of future opportunities for action.

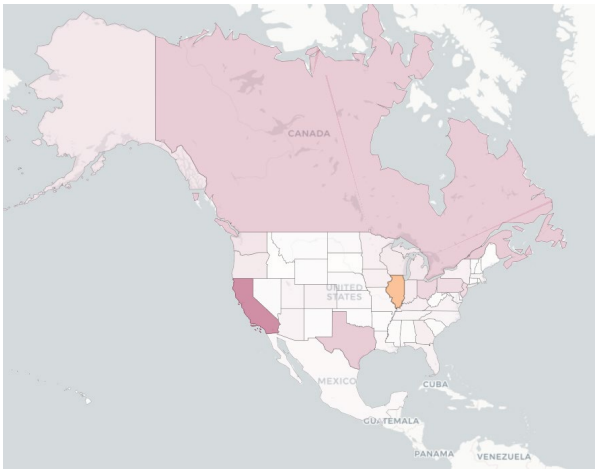
2.0 Defining the Problem

2.1 What Does Freight Mean to Chicago?

Freight is inexorably entwined within the economy, culture, and way of life for the people of Chicago. As North America's largest inland port, the Chicago region is a nexus where all six Class I railroads and half a dozen cross-country Interstate highways come together. Millions of tons of goods move through the region each year on these national arteries, as well as on the Mississippi River tributaries, the Great Lakes system, and through Chicago's O'Hare International Airport. The region's biggest trading partners are the ports and urban hubs of North America, including California, Texas, Ohio, Pennsylvania, and Canada (**Figure 5**). This activity accounts for $1.2 trillion[5] of freight that moves each year through Cook County, supporting the Chicago region's economy, employment, and way of life.

Despite the importance of the Chicago region as a national hub for manufacturing and commerce, most people consider freight only in the context of how it affects their day-to-day lives: the clang of the warning systems and clack of the railroad tracks where rail and roadways meet, or the roar of the cargo plane overhead as it claws the sky for altitude. Perhaps most commonly, people think about freight as the rumble of semi-trucks, waste management trucks, and ubiquitous merchant delivery trucks hauling goods across the city every day.

Figure 5. Cook County Freight Origins and Destinations (Outside of Illinois), 2019



Source: Cambridge Systematics analysis of S&P Transearch Data, 2019.

Note: Darker shaded states/countries indicate higher volumes of trade.

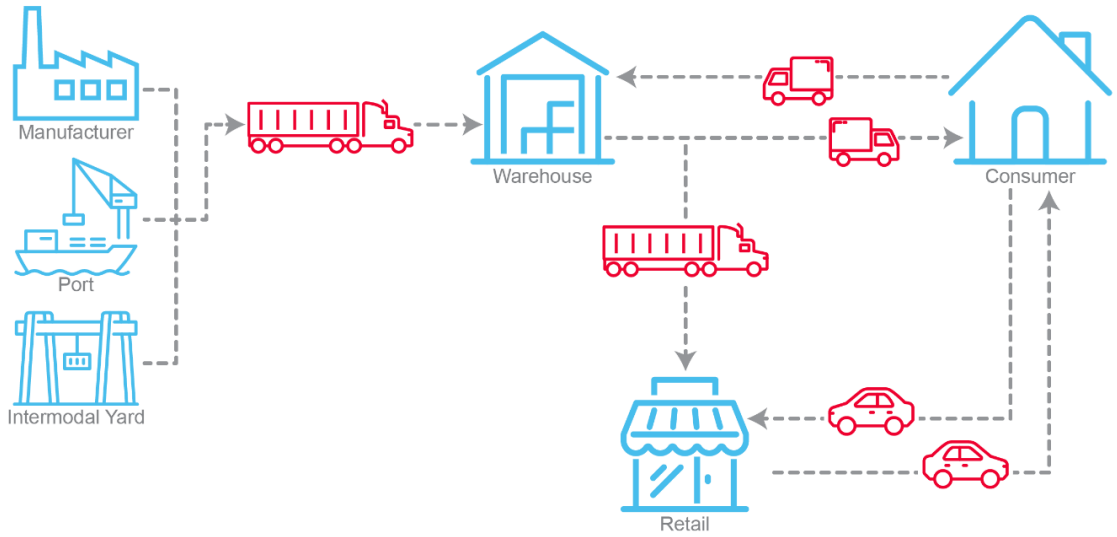
Freight assessments often emphasize large, national scale impacts. Economic statistics in the millions, billions, and trillions support this perception. However, while the national picture is important, equally important are the human-scale impacts of freight, particularly trucks. Trucks of all types and sizes operate within Chicago's neighborhoods and impact the health, safety, and well-being of communities. It is estimated that more than 400 people in Illinois will die and thousands will become sick in 2023 due to pollution from diesel trucks.[6] Negative externalities of traffic congestion, safety concerns, and noise also significantly impact local residents' daily lives.

[5] S&P Transearch data for Cook County, 2019, analyzed by Cambridge Systematics 2022.

[6] https://chicago.suntimes.com/2022/5/29/23144783/diesel-truck-pollution-costs-lives-in-illinois-environment.

A significant share of freight moving in and out of the Chicago region is comprised of nonmetallic minerals, chemicals, food products, petroleum products, and coal. However, the majority of traffic is what is often referred to as *Secondary Traffic* or *Mixed Shipments*, which consist of goods moving to and from warehouses, wholesalers, and retailers, primarily via truck. In today's economy, many of these goods travel long distances across oceans and over land utilizing a range of modes, but ultimately it is a truck the performs the final delivery to a retail store or directly to the consumer (**Figure 6**).

Figure 6. Trucks Are the Key Link in Modern Consumer Goods Supply Chains

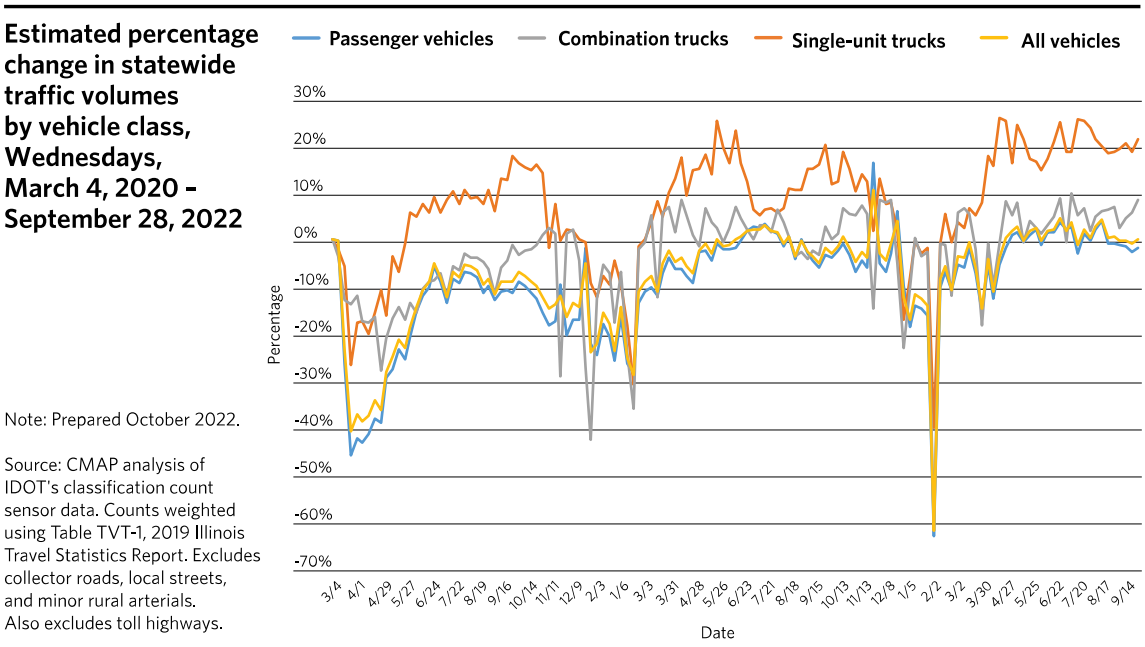


Source: Cambridge Systematics

With 1.7 million jobs and $227 billion in gross regional product tied to the extraction, manufacture, sale, and movement of goods,[7] the economy of the Chicago metropolitan region is inexorably tied to freight, and specifically trucks. While the Covid-19 pandemic initially brought a brief lull, the subsequent rapid growth of e-commerce meant that single unit trucks, including delivery trucks, reached their pre-Covid levels within 3 months of the start of pandemic restrictions in 2020. By 2021, these levels were 25 percent higher than pre-pandemic, as shown in **Figure 7**, and in the subsequent years it has become clear that these trends of goods shipped directly to consumers are here to stay. In January 2023, truck traffic levels continued to be 20 percent higher than pre-pandemic. These trends are consistent with other cities across the US. This, combined with other economic trends, means that trucks and truck-related issues will continue to be prominent throughout Chicago for the foreseeable future.

[7] AECOM analysis of ESMI data, 2022.

Figure 7. Truck and Traffic Impacts of the Covid-19 Pandemic, 2020 - 2022



Source: Chicago Metropolitan Agency for Planning

2.2 Why Are there so Many Trucks in Chicago?

Trucks are the backbone of the national freight economy, moving 53 percent of all goods on a tonnage basis in Illinois and an even higher share of goods nationwide. It is estimated that almost 38 million trucks of all sizes are currently registered in the United States.[8] The largest heavy-duty trucks, typically called semi- or tractor-trailers, haul trailers up to 53 feet in length, and are most often seen locally on expressways and major arterial streets moving goods to and from businesses. Smaller light- or medium-duty trucks and delivery vans are used to transport goods within the city both to businesses and directly to consumers.

While there has been substantial growth in local and regional truck traffic since the onset of the Covid-19 pandemic, the pandemic disruptions largely accelerated existing trends in e-commerce and online retail. The Chicago Metropolitan Agency for Planning (CMAP) reports light-truck traffic had increased 20 percent between 2019 and 2023, while large truck traffic increased 10 percent over the same time period, contributing to the region being among the most congested in the nation.[9]

E-commerce magnifies the number of trucks needed in the supply chain, particularly due to the disaggregation required for shipping individual or small groups of products directly to a

[8] https://www.trucking.org/economics-and-industry-data.

[9] https://www.dailyherald.com/news/20230110/bumper-to-bumper-chicago-area-ranked-worst-in-the-nation-for-traffic-congestion-

consumer, rather than large quantities of goods to retail stores. Since 2014, e-commerce sales globally have seen a nearly four-fold increase[10], and the use of trucks has necessarily increased to support this. In 2022, there were over 666 thousand registered trucks weighing over 8,000 lbs. in the State of Illinois, and about 120 thousand in Cook County alone. This is an increase of almost 28 percent from County registration numbers from 2018, with a significant portion of this growth due to changes in the economic structure from the pandemic and e-commerce.[11]

Given the ubiquitous influence of freight on the region's economy and way of life, it would neither be practical nor desirable to completely remove trucks from communities. However, there may be opportunities to reduce the overall amount of truck travel or mitigate the impacts of trucks on communities. These opportunities will be explored in Chapters 3 and 4.

2.3 Adverse Impacts of Trucks

While critical to our economy and our daily life, trucks can cause real and complex problems to communities. Truck activity also presents an equity issue. While certain communities may be more likely to bear a disproportionate burden of trucks—due to the location of industries, and the resulting freight-related activities in the vicinity in general—other adjacent communities still benefit from the services provided by those trucks. Sometimes, these adjacent communities may also have more resources available to limit or mitigate the negative impacts within their own community. Several factors drive the attraction of truck traffic in a particular area, including:

- **Economic systems.** Strong market economies often generate high volumes of truck traffic. Both public and private sector actions contribute to these systems. Private sector entities make investments to access markets, and increasing customer expectations for e-commerce and short delivery times have in recent years led businesses to expand their distribution and logistics footprints within cities. At the same time, public sector entities have encouraged freight and warehousing development through economic development programs and infrastructure policy and investment, including allowing former or disused manufacturing and industrial areas to be repurposed for high-demand distribution and logistics spaces.

- **Land use and zoning.** The locations of businesses, warehouses, and consumers shape truck origins and destinations. Zoning regulations--including facility size, parking requirements, and traffic control or infrastructure requirements for developments—shape truck traffic flows and volumes along adjoining roads.

- **Transportation Infrastructure, Policies, and Regulations.** Larger arterial roadways and roadways with proximity to highways will tend to focus truck traffic due to their ease of

[10] https://www.ecommerceceo.com/.

[11] Office of the Illinois Secretary of State, Vehicle Counts by County. https://www.ilsos.gov/departments/vehicles/statistics/lpcountycounts/home.html.

access and their connection to the broader transportation network. Regulations such as weight limits or height limits may further direct truck traffic to specific routes, which can create negative impacts on residential neighborhoods adjacent to these corridors.

The types of adverse impacts trucks have on communities can broadly be divided into three categories:

- **Transportation impacts**, such as increased traffic congestion and reduced mobility, comfort, and convenience for people driving, taking transit, walking, bicycling, and using micro-mobility vehicles. These impacts are more prevalent in places where infrastructure geometry or horizontal/vertical travel clearances are limited. Trucks also have greater size and inertia relative to other vehicles on the road, which create real and perceived safety risks. The greater size and weight of trucks also increases wear-and-tear on roadways, leading to increased maintenance requirements and state of good repair expenditures in communities.

- **Health impacts** from emissions and reduced air quality. Air pollution from trucks, ranging from exhaust to particulate matter from tires and brake pads, contribute to respiratory issues and are correlated with higher incidences of heart and lung disease, as well as higher mortality rates from those ailments. A 2022 report from the Respiratory Health Association estimates that diesel exhaust will lead to more than 5,000 asthma attacks, nearly 200 heart attacks, and 416 premature deaths in Illinois in 2023.[12]

- **Community impacts** affecting quality of life, including noise and vibration from heavy vehicles. Community stakeholders have stated that the presence of truck traffic and freight facilities may limit other economic development opportunities, while the air quality and safety risks associated with trucks discourage more desirable activity on neighborhood streets.

Impacts can range from localized and immediate (e.g., traffic congestion and safety concerns) to systemic and long-lasting (e.g., reduced air quality and increased health impacts). Each of these impacts is further described in the following subsections.

2.3.1 Transportation Impacts

Trucks are large, heavy vehicles that cause significant impacts to roadways as well as surrounding communities. Trucks take up additional space on roadways, cause congestion due to their size and handling characteristics, require roadway geometric design considerations both horizontally and vertically,

"I live on a one-way street in the city, and there typically are two Amazon trucks and a FedEx truck blocking traffic two or three times a day" – Comment from SWICTS Study Focus Group participant

[12] Respiratory Health Association. "The Dirty Dozen: The Impacts of Diesel Engine Pollution in Illinois." May 2022. <https://resphealth.org/wp-content/uploads/2022/05/Dirty-Dozen-Impact-of-Diesel-Engine-Pollution-in-Illinois.pdf>

and create real and perceived safety conflicts with other users on shared corridors.

Truck Concentrations in the Study Area

While trucks are found everywhere throughout the City of Chicago, the SWICTS study area has a concentration of trucks that is higher than average. Vehicle counts conducted by the Illinois Department of Transportation (IDOT) and analyzed by the Chicago Metropolitan Agency for Planning (CMAP) in 2018 and 2019 show that the prevalence of trucks is higher in the southwest industrial parts of the city, as measured both by total truck counts and by percentage of trucks. **Table 2** illustrates the difference in truck counts and percentage between the City of Chicago and the study area; heavy vehicle types as a share of total traffic volumes are 20 to 28% greater in the study area than in the city as a whole.

Table 2. Heavy Vehicle Counts and Percentages in the Study Area and Chicago

Measurement	Chicago	Study Area
Total Heavy Vehicle Percentage	6.5%	8.3%
Single Unit Truck and Bus Percentage	3.9%	4.9%
Multi-Unit Truck Percentage	2.5%	3.0%
Trucks per square mile (Figure 9)	5,322	7,683

Source: CMAP, IDOT

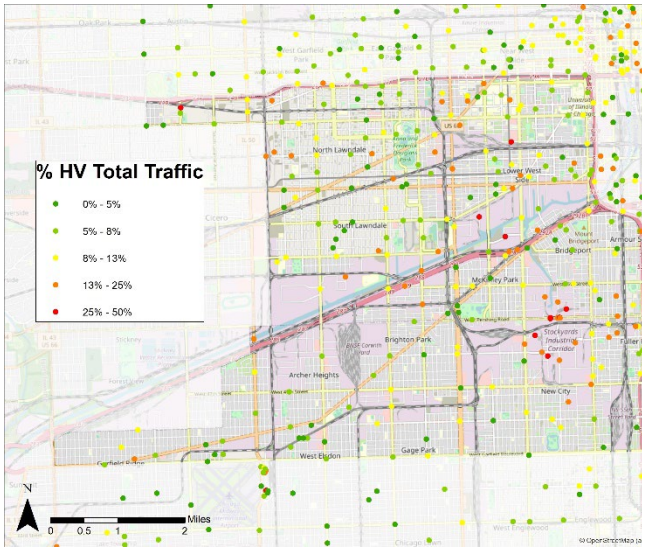
In the study area, major arterials such as Cicero Avenue, Ashland Avenue, and Kedzie Avenue carry trucks on and off other major corridors, including I-55 and I-290. Truck traffic is also higher in and around the City's designated industrial corridors[13], such as the Stockyards and near intermodal facilities like the BNSF Corwith Yard.

Other roadway users in this area encounter traffic with trucks making up to 50 percent of the vehicles (**Figure 8**). Additionally, limited vertical clearances on certain routes due to low overpasses redirects truck traffic to other key roadways, further increasing the number of trucks.

[13] https://www.chicago.gov/city/en/depts/dcd/supp_info/repositioning-chicago-s-industrial-corridors-for-today-s-conomy.html

At the start of the pandemic, truck traffic fell sharply, but quickly rebounded and increased due to shifts in the economy, particularly e-commerce. As shown in **Figure 9**, truck traffic is higher in the study area than in surrounding communities, in part driven by these trends and the increasing freight-related development in this area. Presently, in addition to heavy trucks on major corridors, travelers must contend with smaller delivery trucks that go deep into residential areas, obstructing travel on local streets due to their size or obstructing bike lanes in order to park and make a delivery. Competition between delivery businesses means that residents may receive deliveries from over half a dozen different companies—all using their own vehicle —in a single day.[14]

Figure 8. Percent Truck Traffic in the SWICT Study Area

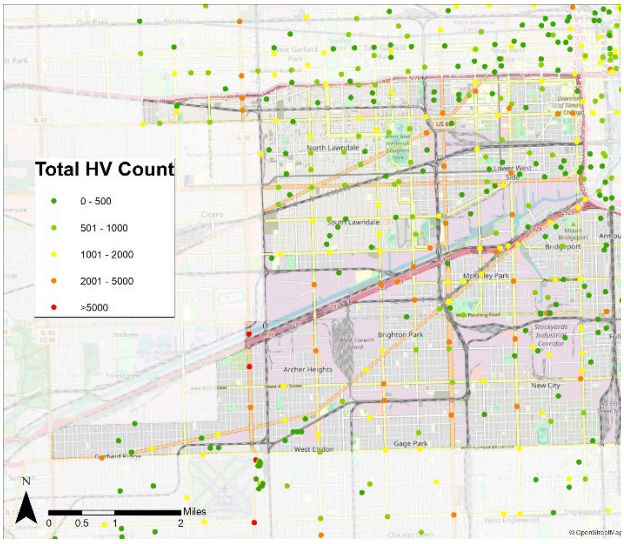


Source: CMAP.

Increased Delay

Trucks take up additional space on roadways and cause congestion due to their size and handling characteristics. As previously indicated, trucks parking and making deliveries increase delays by blocking auto lanes and bike lanes.

Figure 9. Truck Traffic Counts in the SWICT Study Area



Source: CMAP.

Road and Bridge Deterioration

Due to their size and weight, trucks cause more stress on roadway pavement and bridges than standard automobiles, increasing their rate of deterioration. This in turn contributes to potholes and uneven pavements that motorists or bicyclists experience, potentially increasing wear on those vehicles and even creating safety concerns. A five-axle tractor-trailer loaded

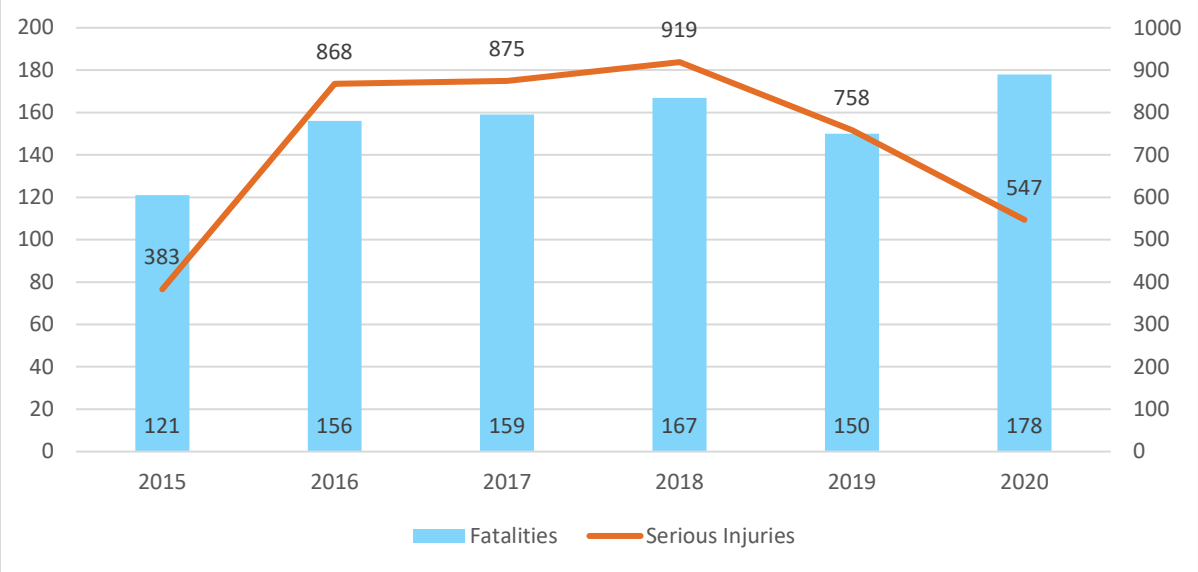
[14] https://www.chicagobusiness.com/crains-forum-freight/crains-forum-freight.

to 80,000-pounds has the same impact on a highway as 9,600 automobiles. In addition, as truck axle weights increase, pavement damage increases an at even faster rate. For example, while a truck axle carrying 18,000 pounds is only 9 times heavier than a 2,000-pound automobile axle, it does 5,000 times more damage. Trucks also occasionally strike bridges and viaducts, potentially causing damage to those structures. Signal arms and signs also are sometimes struck by larger trucks on tighter city streets.

Safety Implications of Trucks

Trucks are a safety concern for residents in the Chicago region. Truck-involved crashes are more likely to result in serious injuries or fatalities than other types of crashes. The 2017 Illinois Strategic Highway Safety Plan found that, in 2014, large trucks were involved in 6.7% of all crashes, but accounted for 13% of fatal crashes, indicating a higher risk of injury or death. The 2022 Illinois Strategic Highway Safety Plan identified that counts of heavy vehicle-related fatalities and injuries got worse in recent years, increasing over 40% statewide between 2015 and 2020 (see **Figure 10**). Within the truck-related incidents in the state, 35% of heavy-vehicle fatalities and serious injuries were intersection-related; 89% of these incidents occurred on arterials.[15]

Figure 10. Heavy Vehicle Fatalities and Serious Injuries in Illinois, 2015 - 2020



Source: IDOT.

Furthermore, high volumes of trucks make people feel unsafe near roadways, which disproportionately hinders vulnerable road users such as people walking or bicycling, as well as creating greater possibilities for crashes between these users. Sometimes, schools or other

[15] Illinois Department of Transportation, "Illinois Strategic Highway Safety Plan: 2017 - 2022,"; "Illinois Strategic Highway Safety Plan: 2022 – 2026."

sensitive uses such are hospitals are located near industrial facilities, increasing the exposure of children and vulnerable groups to truck activity.

2.3.2 Health Impacts

Trucks are a significant contributor to poor air quality in the City, which in turn contributes to reduced health outcomes for residents. Air pollution from trucks, ranging from exhaust to particulate matter from tires and brake pads, contribute to respiratory issues and are correlated with higher incidences of heart and lung disease, as well as higher mortality rates from those ailments.

Monitoring and Measuring Air Pollution

Air pollution is monitored at local, state, and federal levels, but many of the regulations on air pollution, known as National Ambient Air Quality Standards (NAAQS), are set at the federal level by the United States Environmental Protection Agency (EPA) under the authority of the U.S. Clean Air Act (CAA).[16] EPA sets primary standards, which protect public health, and secondary standards, which provide for public welfare (e.g., decreased visibility, damage to animals and vegetation). The pollutant monitoring process by the EPA and local agencies is provided in Appendix B.

The EPA produces requirements and guidance for monitoring and reporting on emission levels of carbon monoxide (CO), lead (Pb), Nitrogen Dioxide (NO_2), Ozone (O_3), fine and coarse Particulate Matter ($PM_{2.5}$ and PM_{10}, respectively), and Sulfur Dioxide (SO_2). States are typically responsible for monitoring and enforcement of these criteria pollutants. Areas (generally counties) are designated as an *attainment area* or a *non-attainment area* for each criteria pollutant, based on whether they meet the standard for the pollutant. Since 2019, Illinois has been in attainment with emission maximums for all NAAQS pollutants except for ozone and, in one circumstance in Madison County, sulfur dioxide. Cook County is currently designated as non-attainment for ozone releases over an 8-hour period.[17]

In Illinois, the Illinois Environmental Protection Agency (IEPA) is the lead agency for monitoring and enforcement. IEPA monitors air quality conditions, including emissions rates for the pollutants listed above, with a network of 64 monitoring sites across the state. Of these 64 sites, eight are located in Chicago and 11 are located in Cook County outside the City, with computer models used to estimate air quality in areas where monitors are not in place.[18] Monitoring sites

[16] 42 USC Chapter 85: Air Pollution Prevention and Control Section 7408: Air quality criteria and control techniques. 42 USC Chapter 85: Air Pollution Prevention and Control Section 7409: National primary and secondary ambient air quality standards.

[17] Cook County's non-attainment status increased from marginal to moderate in 2022, meaning the degree to which the County has surpassed threshold values has increased, raising health risks for residents. According to CDPH, the Chicago region is on a trendline that suggests this status will increase from moderate to serious.

[18] Illinois Environmental Protection Agency. Illinois Air Quality Report 2019. 2019. https://www2.illinois.gov/epa/topics/air-quality/air-quality-reports/Documents/2019AnnualAirQualityReportFinal.pdf.

use both continuous air monitoring sensors that collect data throughout the year and non-continuous sensors that collect samples on three-day and six-day cycles. Because IEPA measures attainment at the county-level, the monitoring network is limited in its coverage of local air conditions and is less effective at capturing local air pollutants and their community impacts, which often occur at too localized a scale for countywide monitoring to capture.

Within Chicago, the Chicago Department of Public Health (CDPH) is responsible for environmental enforcement and regulation of issues that positively and negatively affect the health of residents and communities, including air pollution control. CDPH is authorized to establish and enforce regulations that minimize air pollution. However, this authority is limited to fixed sources; state and local agencies are not able to regulate or enforce emissions standards for diesel vehicles.

Truck Contributions to Air Quality

The health impacts of gasoline and diesel truck exhaust pollutants have been studied extensively both in Chicago and around the world. Many of the pollutants have Occupational Safety and Health (OSHA) exposure limits, but these limits do not have any regulatory requirements when considering outdoor exposure on public streets. Trucks also release dust from brake pads and pulverized tire rubber.

Both diesel exhaust and tire/road debris are sources of multiple air pollutants, including particulate matter, carbon monoxide, sulfur dioxide, nitrogen oxides, and benzene. The presence of fine particulate matter, generated by these sources, correlates with decreased lung function and increased respiratory symptoms, as well as premature death in people with heart or lung disease.

Analyzing Freight Traffic Impacts across Multiple Quality of Life Vectors

CDPH tracks the City's air quality for evaluation and policymaking using an Air Quality and Health Index, which incorporates a broad array of metrics on air pollution and public health. Data for the index comes from a variety of federal and state sources, including the EPA, the US Department of Transportation (USDOT), the American Community Survey (ACS), and the Illinois Department of Public Health (IDPH).[19] This index combines data on the community pollution burden with health factors and social factors to demonstrate the distribution of air pollution exposure across demographic profiles.[20] However, the correlation of air pollution with other population characteristics enables the index to demonstrate the quality of life impacts

[19] Chicago Department of Public Health. Air Quality and Health Index Indicator Description. https://www.chicago.gov/city/en/depts/cdph/provdrs/healthy_communities/svcs/air-quality-and-health.html.

[20] Chicago Department of Public Health Office of Epidemiology. Air Quality and Health Index Data Pack. July 2020. https://www.chicago.gov/content/dam/city/depts/cdph/statistics_and_reports/Air%20Quality%20and%20Health%20Index%20Data%20Pack.pdf.

caused by the presence of freight and industrial activity in these communities. **Table 3** presents the pollution burden and population characteristics that CDPH built into the index.

Table 3. Chicago Air Quality and Health Index Indicators

	Air Pollution	Polluted Sites
Pollution Burden	$PM_{2.5}$ Ozone Diesel PM Air Toxics Cancer Risk Air Toxics Respiratory Hazard Index Traffic volume and proximity	Proximity to Risk Management Plan sites Proximity to Hazardous Waste Treatment, Storage, and Disposal Facilities Proximity to National Priorities List, Superfund program sites
	Health Factors	**Social Factors**
Population Characteristics	Asthma prevalence Chronic obstructive pulmonary disease prevalence Coronary Heart Disease prevalence Low birth weight Young age Old age	Percent low income Percent minority Percent less than high school education Linguistic isolation Unemployment Housing burdened low-income households

Source: Chicago Department of Public Health.

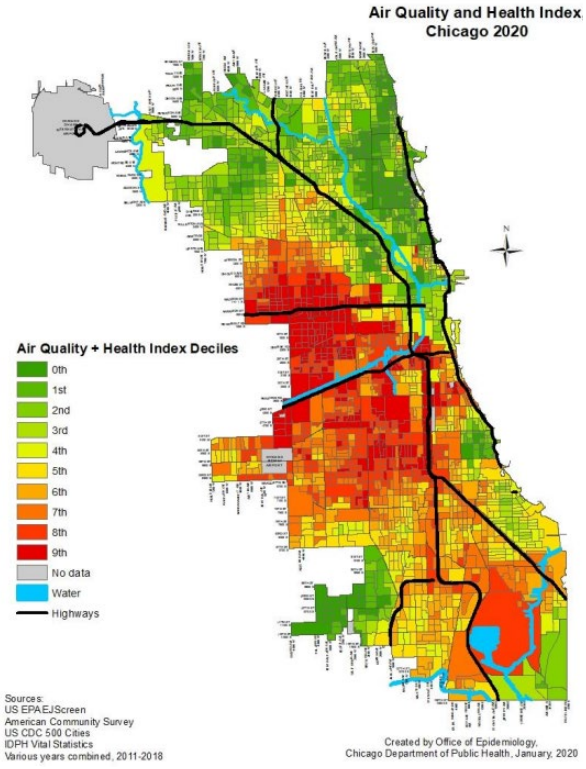
Data is collected for each indicator at the census block level and is assigned to a percentile based on the distribution of data values across census blocks in the city. The purpose of the index is to inform decision-making and prioritize locations within the city for emissions reduction and mitigation efforts that can improve public health at the neighborhood level.

CDPH presented the findings of the Air Quality and Health Index in its 2020 Air Quality and Health Report. The results of the analysis show that, while poor air and health quality is pervasive throughout the south and west sides of Chicago, the worst neighborhoods within these areas are those that border major limited-access interstate highways as shown in **Figure 11**. Some areas with higher concentrations of industrial and warehousing uses also rank high on this index. These findings are consistent with an analysis of air quality data collected from over 100 sensors that Microsoft installed throughout the City in summer 2021, in collaboration with the City and various non-profit organizations.[21]

[21] Esie, Precious, Madeleine I.G. Daepp et al. "Neighborhood Composition and Air Pollution in Chicago: Monitoring Inequities with a Dense, Low-Cost Sensing Network, 2021." *American Journal of Public Health.* December 2022. < https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2022.307068?journalCode=ajph> See also: Gupta, Smart et al. "The dangers in our air: Mapping Chicago's air pollution hotspots." *The Chicago Sun-Times*. 16 May 2022. https://chicago.suntimes.com/2022/5/16/23069860/dangerous-air-we-breathe-mapping-chicago-air-pollution-hotspots-pm2-5-particulate-matter.

The analysis, led by the Chicago Sun-Times, radio station WBEZ, and MuckRock, a non-profit news agency, found that the worst air pollution levels in areas with sensors were located in the south and west sides at the following locations:

Figure 11. Chicago Air Quality and Health Index, 2020



Source: Chicago Department of Public Health

- Along 26th Street near Central Park and California avenues, and near the intersection of California Avenue and Cermak Road in the Little Village neighborhood – both of which are within the Study Area.
- At two locations along streets near the Kennedy Expressway in the Irving Park and Avondale neighborhoods.
- At six locations in the Austin neighborhood, with the highest near a bus stop at Chicago and Cicero avenues.
- Along Halsted Street near 74th Street in the Englewood neighborhood and 87th Street in the Auburn-Gresham neighborhood.

In 2023, CDPH updated and expanded the Air Quality and Health Index into the Chicago Environmental Justice Index. This revised Index was prepared as part of the Chicago Cumulative Impacts Assessment (CIA), which CDPH directed along with the Chicago Office of Climate and Environmental Equity and a 15-member group of nonprofits and community organizations known as the Environmental Equity Working Group. The CIA was undertaken as part of a May 2023 Executive Order issued by the Mayor's Office and a Voluntary Compliance agreement with the United States Department of Housing and Urban Development (HUD) and was defined as a "citywide project to provide data on how environmental burdens and stressors vary in impact across the City."[22]

The Chicago Environmental Justice Index built on the AQHI, adding additional categories for a broader array of environmental and public health issues, as shown in **Table 4** below. This expansion includes freight facilities and wastewater discharge sites, both of which represent essential economic and civic infrastructure sites that have locally-borne impacts on the

[22] City of Chicago. Chicago Cumulative Impact Assessment 2023 Summary Report. < https://www.chicago.gov/content/dam/city/depts/cdph/environment/CumulativeImpact/oct-update/CIA_ExecutiveSummary_9.17.23_v3.pdf>

communities in which these facilities are located. Their inclusion in this Index is a recognition of the impacts of the existing economic and civic system and the costs they incur in communities.

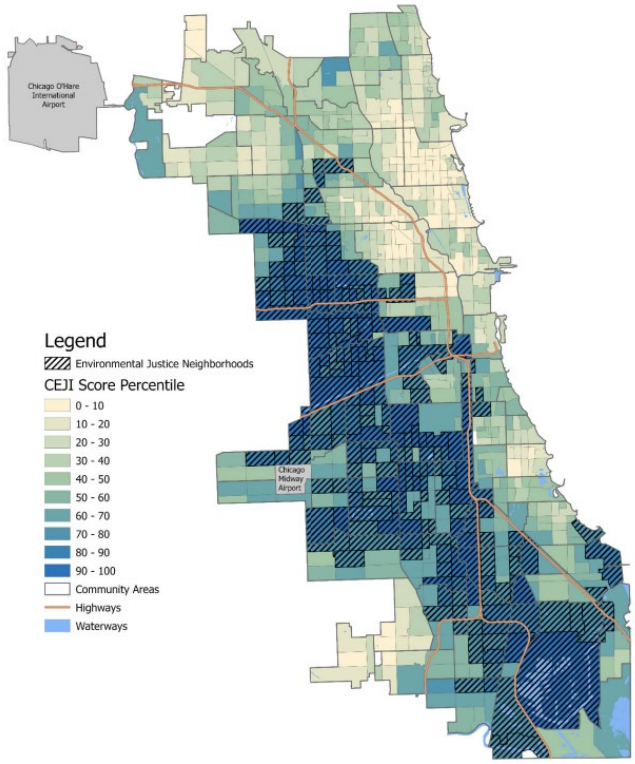
Table 4. Chicago Environmental Justice Index Indicators

Pollution Burden	Population Characteristics
Environmental Exposures Component	**Sensitive Populations Component**
Air toxics all-organ hazard index Air toxics cancer risk Childhood lead poisoning Diesel Particulate matter (PM) Ozone PM 2.5 Toxic releases Traffic volume and proximity	Asthma Coronary heart disease Disability Low birth weight Old age (65 years and older) Young age (Less than 18 years)
Environmental Conditions Component	**Socioeconomic Factors Component**
Consequential facilities Freight rail lines Hazardous waste facilities Polluted sites Risk Management Plan sites Toxic Release Inventory sites Wastewater discharge	Housing burdened, low income Less than high school education Linguistic isolation Low income No health insurance People of color Unemployment

Source: City of Chicago Cumulative Impact Assessment

While the expanded definitions are useful for calling attention to a broader array of issues and encouraging City agencies to take a more comprehensive approach to analyzing environmental justice issues, it is important to note that the CEJI map is very similar to the initial AQHI map, as shown in **Figure 12** below. Both maps demonstrate a concentration of public health and environmental justice issues on the south and west sides of the city and indicate that the worst neighborhoods within these areas are those that border major limited-access interstate highways.

Figure 12. Chicago Environmental Justice Index Map, 2023



2.3.3 Community Impacts

Trucks are large, often noisy vehicles that cause significant impacts to roadways as well as surrounding communities. People who live, work, or travel in industrial areas are more impacted by trucks than other residents.

Perceptions of Trucks in Chicago Communities

Truck traffic and freight-intensive land uses impact the overall quality of life within Chicago neighborhoods beyond measurable health and mobility challenges, as reported through targeted listening sessions that were conducted with community groups as part of the SWICTS outreach efforts (see **Appendix B**). Community groups attribute much of the increase in truck traffic to the increase in warehouses, which rapidly increased in number and size throughout the Chicago metropolitan area in the post-pandemic era.[23]

The prevalence of trucks in certain neighborhoods is seen as an equity issue by City residents. The high volumes of truck traffic along roads and at warehouses contribute to a perspective among residents that their neighborhoods are being targeted to handle these activities in order

[23] Rogal, Brian J. "A boom in Chicagoland warehouse construction could cut costs for consumers." *The Chicago Tribune*. 16 June 2022. <https://www.chicagotribune.com/business/ct-biz-warehouse-construction-boom-20220616-ih6pdacukrauhnnlxna3dapdli-story.html>

for trucks to be “out of sight and out of mind” for residents in wealthier neighborhoods. Local community members perceive that their needs and priorities are being overridden by citywide demands for growth and efficiency in freight delivery.

In these listening sessions, community members also described how the high volume of truck traffic impacts their perceptions of community safety, asserting that these trucks—specifically their pollution or safety risks—make the local streets feel unsafe for bicycling or unappealing for walking. The barriers to walking and biking reduce foot traffic along neighborhood streets, limiting local retail activity and contributing to the perception that the neighborhood is unsafe.

Community groups also asserted that the concentration of freight activities hinders neighborhood economic development potential. Since warehouses take up large amounts of space and create certain nuisances within the community, they have a negative impact on economic growth and development for community-owned businesses, such as retail or dining. And while the warehouses employ large numbers of people, the number of jobs per square foot of space is considerably less than manufacturing; further, community representatives stated that these jobs were considered dangerous, low-wage jobs with limited advancement opportunities, further hindering wealth creation within the communities.

Truck traffic also creates other quality-of-life issues that impact communities, which may not be measurable and thus cannot be quantitatively reported. For example, truck traffic generates greater noise and vibration than other vehicular traffic, as trucks are often 20 or more times heavier than passenger vehicles. Continual exposure of humans to such loud noise for long hours can often lead to several health issues, such as increased stress/anxiety levels, high blood pressure, and heart disease, among others, thereby disrupting human activities and health. The physical space needed to accommodate trucks may also limit the options for streetscape design, including shade trees, bollards, curb bump-outs, enhanced bus stop designs, and other features intended to increase traffic safety and improve accessibility for people walking or bicycling.

3.0 Addressing the Adverse Impacts of Trucks

The high number of trucks that Chicagoans encounter on a daily basis is the result of decades of policy, economic, technological, and social transformations in the U.S. and worldwide that have culminated in a way of life that is dependent on trucks. In economic terms, trucks can be considered an externality of the current industrialized, consumer-driven society. In most cases they are the only modal option available to pick up or deliver goods, as the other freight modes – rail, water, air - lack the necessary infrastructure and/or service characteristics, while also having their own inherent impacts. While broad economic impacts are beyond the scope of this study, it is important to note the scale of their effects.

Because trucks are so critical to moving goods in the current economic system, there is no easy remedy for solving the challenges associated with trucks. The idea of removing trucks from communities via a quick fix—such as through punitive regulation—may seem attractive at first glance. However, experience has shown that this type of unilateral action often leads to immediate and substantial negative economic and social impacts, both to the detriment of the region and the community: closure of businesses reliant on logistics or delivery, loss of community jobs, loss of tax base, increase in cost of goods, and increase in delivery times for consumers and businesses. Moreover, this type of localized action is not likely to result in an economic system that is more effective or removes completely the root causes of market-based trucking issues.

Trucks are an example of a "wicked problem" - one to which there is no single solution, and any solution to one aspect of the problem is only partial and may cause or increase challenges in another area.

The complexity of the issues surrounding trucks, including balancing the tradeoffs between various potential solutions, can be described as a "**wicked problem,**" one in which *no clear or attainable solution is present that overcomes the economic and social influences that create it*.[24] Some of these influences are global, such as the continuing rise of e-commerce coupled with recent economic changes due to the Covid-19 pandemic, which have continued to increase demand for freight and reliance on truck-centric delivery models.

Both historically and currently in the Chicago region and throughout North America, the movement of freight has been a private-sector, for-profit venture, and many decisions for truck operations and facility deployment are made in the economic context of profit motives without direct consideration for the social context of community impacts. Trucks are owned and operated by private-sector businesses, and truck drivers are employed by those businesses – or are themselves the owners. The decisions made within the private sector sphere are designed to maximize their economic potential through competitive advantage.

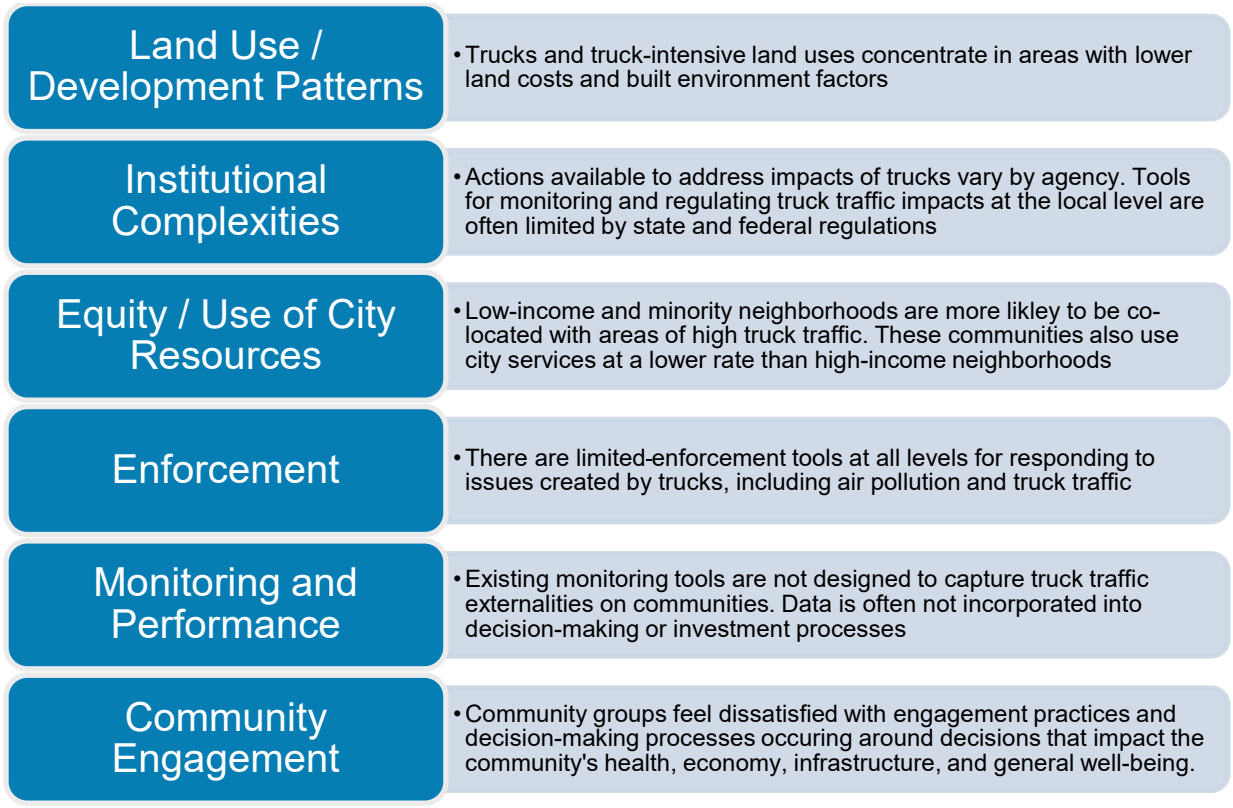
[24] See Kolko, Jon. *Wicked Problems: Problems Worth Solving. A Handbook & A Call To Action.* Austin Center for Design. Austin, TX. 2012.

Regardless, significant societal costs, described in the last chapter, occur in communities due to this reliance on trucks. This chapter lays out a discussion of the complex tradeoffs that public agencies face when dealing with issues related to trucks, and a conceptual framework for addressing the impacts of trucks. Chapter 4 builds upon this conceptual framework and discusses opportunities for addressing truck issues within the specific context of Chicago.

3.1 Tradeoffs Faced When Addressing Impacts of Trucks

This subsection discusses some of the tradeoffs that public agencies must contend with when addressing adverse impacts of trucks. While this study is explicitly focused on tradeoffs present in the Southwest Industrial Corridor study area, many of these experiences are broadly shared throughout the City, as well as in other urban and even rural areas throughout the U.S. Some factors, such as equity and community engagement, are particularly relevant in areas that match the character of the SWICTS study neighborhoods. These tradeoffs are outlined in **Figure 13** and described in more detail below.

Figure 13. Overview of Tradeoffs to Addressing Adverse Impacts of Trucks



3.1.1 Land Use and Economic Development Patterns

Truck volumes are not evenly distributed throughout the City. Truck traffic in the SWICTS study area represents 8.3% of total traffic compared to 6.5% for the City as a whole. There are an

array of historic, economic, and political factors influencing land use and development patterns that have produced this disparity.

In the era of e-commerce, the geographic distance between private sector freight facilities and the consumer has greatly decreased, increasing the frequency with which trucks operate in neighborhoods and increasing the demand for industrial and warehouse space within communities. Developers and warehouse operators want close proximity to neighborhoods to provide more responsive services and reduce delivery time, but the land economics and political organization of higher-income neighborhoods that disproportionately drive demand for e-commerce also limit nearby development opportunities for these warehouses. Higher-income areas have more expensive land costs, reducing the cost-effectiveness of warehouse development, and higher-income residents have the economic and political capital to organize against developments that they oppose.

As a result, developers and operators seek sites where large amounts of land are available at lower cost, and often these sites are located in or adjacent to low-income neighborhoods where industrial zoning is still prevalent. Low-income neighborhoods therefore become home to a disproportionate share of distribution and logistics facilities. These areas are also more likely to have a history of industrial development and a legacy transportation network that facilitates truck movement, including wider, higher-capacity streets that accommodate high traffic volumes and higher speeds. These types of environments discourage use of streets by vulnerable road users, particularly people walking or bicycling who incur greater discomfort and safety risk when traveling in these conditions. This can lead to limited broad-based economic development. For example, reduced foot traffic along auto-oriented corridors may hinder the development or sustainability of locally-owned, neighborhood-scaled retail bases, particularly the street-facing storefronts that are common land uses in many Chicago neighborhoods.

The two-mile corridor of W. 31st Street in Little Village between Sacramento Avenue and Kostner Avenue is representative of this land use pattern. Despite having two parks and two schools located along the corridor, the most common land use type by block is industrial, at 31% of total land use. Similarly, truck traffic as a share of total traffic volume along the corridor is frequently higher than the Citywide average, ranging from 6% between Kedzie and California to as high as 14% between California and 31st Boulevard.

The lack of a robust local economy also contributes to lower property values, which as noted in the previous paragraph, creates a more favorable market for the industrial and warehousing sectors who are looking to build in areas with low real estate costs. These trends can produce a self-reinforcing pattern in which concentrations of distribution and logistics facilities hinder other forms of economic development and create more favorable environments for future warehouse development, as shown in **Figure 14** below. The result is perpetuating inequities due to a local economy and a transportation network that supports higher freight activity, reduces economic opportunity for community residents, and increases health and safety risks.

Figure 14. The Circular Pattern of Truck Traffic and Industrial Development in Low-Income Neighborhoods

3.1.2 Institutional Complexities

Freight issues are regulated by a complex framework of local, state, and federal agencies with a wide array of functions for all three branches of government: executive, legislative, and judicial. Each branch of government administers specific functions based on its jurisdictional authority, with the different levels of government working concurrently on their own objectives, which are not always aligned among various agencies.

To consider the example of air quality, regulations regarding permissible air pollution levels are set at the federal level through acts of Congress (legislative) and EPA rulemaking (executive), and the IEPA monitors regional air conditions at the State level to ensure compliance (executive). At the local level, CDPH responds to citizen complaints, inspects facilities, issues permits, and enforces local laws (executive), while the City Council sets zoning and land use regulations that determine what uses are permitted within the City limits (legislative). Across all levels, air polluters that violate standards can be fined by law enforcement agencies or tried in criminal and civil lawsuits (judicial). **Table 5** provides an overview of the different agencies that could potentially be involved in regulatory action related to trucks within the City of Chicago.

Table 5. Regulatory Framework of Agencies Impacting Trucks, Air Quality, and Related Issues within the City of Chicago

	Federal	State	Local
Executive	President EPA USDOT Other Agencies	Governor's Office IEPA IDOT Other State Agencies	Mayor's Office CDOT DPD CDPH BACP CDSS
Legislative	Congress	Illinois General Assembly	City Council
Judicial	Federal Law Enforcement Federal Court	Illinois State Police State Courts	Chicago Police BACP (Citations)

This multi-layered regulatory framework creates complexity in terms of setting and enforcing air quality standards. While city and state government agencies have tools to monitor and improve air quality in Chicago, state and federal regulations, respectively, restrict their ability to set more restrictive standards and drive improved air quality and public health outcomes. For example, IEPA must adhere to NAAQS set by the U.S. CAA (see **Table 26** in Appendix A), while CDPH must adhere to the pollution standards set by the Illinois Pollution Control Board (IPCB), in addition to the CAA NAAQS standards.[25]

Similarly, neither state nor local agencies can set standards related to fuel economy or low-carbon or renewable fuel standards for mobile sources, such as vehicles; they can only enforce the fuel standards established by federal regulation.[26] When the City of Chicago or the State of Illinois pursue more rigorous air quality and public health outcomes, they must do so through incentive programs or voluntary programs that encourage better performance from local or regional polluters, but these entities cannot mandate it.

[25] The IPCB is an independent quasi-legislative and quasi-judicial administrative agency. The IPCB is authorized under state legislation to set environmental standards for pollution control, and the IEPA enforces these standards through inspection, monitoring, and permitting programs.

[26] An exception to this is California, which can set its own fuel economy standards via the California Air Resources Board and has historically done so at a more rigorous level, States can model their standards after California's more rigorous standards, but only 17 other states have done so as of 2022, and Illinois is not among them.

The focus on threshold values downplays the public health risks of elevated (but not threshold) pollution levels. For example, Chicago's particulate matter pollution levels do not exceed current EPA standards,[27] but do exceed the recommended levels identified by the World Health Organization.[28] A permit holder may produce pollution at the site up to a statutory maximum, but the permit holder's pollution is not evaluated in the context of adding to existing local environmental conditions. Therefore, several polluting facilities, operating in proximity to each other within a neighborhood but individually producing below the statutory maximums, may create an aggregate level of pollution that could be harmful for public health and well-being.

Federal and state regulations for air quality often fail to capture localized air conditions that have a greater impact on community health and quality of life but may differ from the regional conditions that are the focus of federal and state regulations.

These regulatory preemptions do not only affect standards enforcement, they also influence air quality monitoring. Federal and state regulations for air quality focus on regional conditions, and therefore air quality monitoring networks are designed to produce regional data and look for aggregate pollution emissions that exceed federal threshold values. These monitoring procedures may not necessarily capture localized air conditions that may be more relevant to individual communities and may be different than regional conditions due to the ways in which air pollutants can be concentrated in a smaller area due to weather patterns, topography, or building heights. The regulatory standards set for air quality monitors themselves may also affect the ability to do more effective air quality monitoring. Additional risks and limitations associated with air quality monitoring are discussed in Appendix A.

3.1.3 Equity and Use of City Resources

While macroeconomic conditions may create inequity, application and distribution of certain public resources can exacerbate inequities. Interactions between City residents and City agencies and services are complex and vary between neighborhoods. As discussed in previous sections, both data and lived experience show that adverse impacts of trucks are often felt more in economically disadvantaged and minority neighborhoods. This study also examined community equity through the lens of data gleaned from use of the City's 311 system for issues related to transportation and air quality.

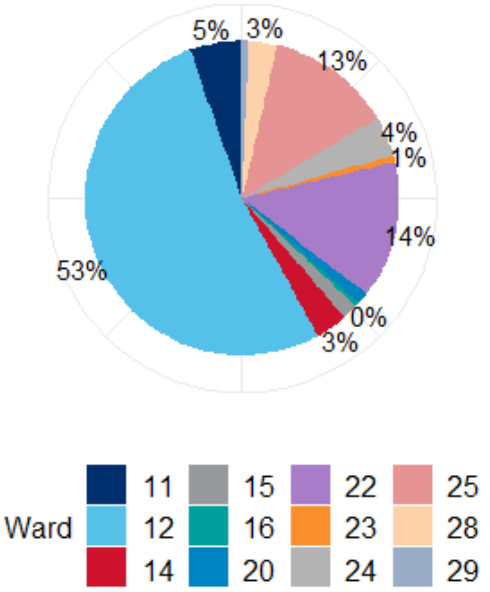
The City's 311 system is a resource to allow residents to identify local issues and make service requests (SRs) to the City for resolution. The 311 system relies on issue categorization to allocate proper resources to deal with the issue; this is done either via customer input options in the online and app-based SR entry systems or via Call Center data entry and processing

[27] In 2021, the EPA announced it was reconsidering its 2020 decision to retain the current NAAQS standard of 12 $\mu g/m^3$. In early 2023, the US EPA announced plans to publish a proposed rule that would lower the limit to 9 to 10 $\mu g/m^3$. This adjustment could potentially place Chicago out of compliance with the rule, as the 3-year (2018-2020) annual design value for PM2.5 over Chicago is about 9.5 $\mu g/m^3$.

[28] Gupta, Smart et al. *The Chicago Sun-Times*. 16 May 2022.

options. In the current framework for SR categorization, no criteria directly relates to truck traffic or vehicle emissions. This prevents residents from calling attention to these issues directly, while also creating a data gap for City staff to directly monitor truck traffic impacts and correlate them with public health and safety risks.

Figure 15. Ward Distribution of Service Requests Related to Pollution, 2018 – 2021



Source: City of Chicago

An analysis of the 311 report logs and SRs in the "Pollution" category in the SWICTS region between 2018 and 2021 showed that 967 total requests were made across this time period for issues related to pollution, as illustrated in **Figure 15**. A significant number of requests in the 12th Ward were driven by concerns about a nearby asphalt plant. Additionally, a significant number of requests in the 22nd Ward were related to the demolition of a former coal power plant in 2020.[29] However, during public outreach for this study, it was found that emissions from trucks are *also* a key concern to 12th and 22nd Ward residents and community groups. The intensity of concern from community groups about truck emissions contrasted with the lack of service requests related to this issue indicate that the 311 System architecture is insufficient for capturing these concerns.

A broader review of 311 logs also showed that service requests are not made evenly across city wards. Wards with higher concentrations of minority and low-income residents – including those wards located in the SWICTS study area – are less likely to use the system than wards with higher concentrations of high-income residents. Given that SRs are often prioritized by count or volume (i.e., issues that have a higher number of SRs are responded to more rapidly by the City), SRs in high-income areas may be more likely to be addressed in a shorter amount of time than SRs in low-income areas.[30]

Wards with higher concentrations of minority and low-income residents are less likely to make 311 service requests.

Since service requests are prioritized by volume, high-income areas may be more likely to have their requests addressed.

[29] https://news.wttw.com/2020/04/14/hilco-issues-apology-demolition-gone-awry-neighbors-demand-prosecution

[30] See, for example: "Chicago planted more trees in wealthier, whiter neighborhoods." *The Chicago Tribune*. 15 June 2022. <https://www.chicagotribune.com/news/environment/ct-chicago-trees-equity-20220612-prpuxgsabzc2fa4fnwnyf4fbku-story.html>

The variation in system use could therefore exacerbate historically inequitable distribution of public resources across the city along economic and racial lines.

The discrepancy in SR submission and fulfillment may represent an unfortunate negative feedback loop that may worsen inequitable outcomes. Lower-income areas of the city may have less awareness that the 311 system exists and well as less trust that the City will respond affirmatively, which leads to fewer SR submissions. This lower volume of SR submissions leads to fewer and longer SR resolutions, raising the perception that the 311 system fails to address community needs quickly or efficiently.

3.1.4 Enforcement

As discussed above, economic and social factors contribute to low-income neighborhoods being home to a disproportionate share of warehouses and logistics facilities. While the growth in e-commerce and warehouse facilities has created jobs in many of these communities, the externalities that accompany this growth has led to conflict between community members and the businesses that operate in these communities. When businesses apply for permits to build or expand facilities, the City of Chicago requires the businesses to go through a permitting process to demonstrate the impacts that the business operations will have on the community. This permitting process includes a Traffic Impact Study that estimates the number of truck trips generated and the impact that additional truck trips will have on traffic conditions.

While the study ultimately needs to be approved by the City, there are no mechanisms in place to ensure that the actual number of truck trips at the facility aligns with the volumes indicated in the Traffic Impact Study. If the business exceeds the number of truck trips approved in the Study, there is no accountability to the local community. As a result, communities may experience more negative impacts than community members were expecting when the City approved the development.

The City of Chicago currently lacks monitoring and enforcement mechanisms to ensure that truck volumes align with the volumes presented in the Truck Impact Study required for permit approval.

Enforcement of air quality is also limited by the regulatory framework's focus on threshold values. If a permit holder's pollution does not exceed the statutory maximum, there is no mechanism to reduce pollution even if its output still has an impact on local air quality conditions and public health. Furthermore, the lack of a cumulative impact assessment on air quality means that the total impact of multiple polluters cannot be addressed. If multiple polluters each separately stay below their maximum pollutant output levels, the City cannot mitigate the aggregated effects of their pollution on the neighborhood.

3.1.5 Monitoring and Performance

Currently, Chicago's framework for monitoring freight movement and identifying priority areas for improvements to the transportation system does not capture the externalities associated with

freight traffic. Although City and State traffic monitoring efforts include factors such as truck volumes or truck-involved crashes to evaluate how truck movements and impacts of trucks change over time, truck volumes and impacts are not incorporated into a cohesive framework for monitoring and management performance. Furthermore, the lack of air pollution data collected from mobile sources limits the City's ability to establish relationships between truck traffic and local air conditions, which hinders issue identification, risk management, and project prioritization for transportation and public health initiatives.

The City of Chicago currently lacks a framework for connecting truck-related performance data to decision-making processes for setting policy or making investments.

As a result, the current performance monitoring framework focuses on information-gathering rather than data-driven decision-making, and data are not used as a control to mitigate negative externalities. The framework does not include target-setting for these metrics, which makes it difficult for City stakeholders to determine intended outcomes for truck traffic management efforts. It is unclear whether successful management of freight movement within the city would result in a decrease in truck traffic volume or controlled growth along particular corridors. It is likewise unclear when higher rates of truck traffic volume growth would be perceived as a problem or trigger a response at the City level.

3.1.6 Community Engagement

As part of this research, listening sessions were conducted throughout the SWICTS study area to gather community feedback on the threats and opportunities that are perceived regarding the adverse impacts of trucks in communities. A summary of these outreach activities is provided in **Appendix B**. Initial outreach pointed to a common set of community and truck traffic concerns. The vast majority ranked the following community and truck concerns as top priorities: air quality, land use, better community engagement with decision-makers, pollution and emissions from trucks, truck traffic near sensitive locations, and traffic safety for people on roads with high truck volumes.

Across the listening sessions, the following themes were also identified:

- **A need to recognize that communities are overburdened and mitigation is not enough:** Community members want alternative visions and innovative solutions to decrease environmental burdens on their communities and remediate past harms. While mitigating the impacts of freight-related land uses is better than nothing, communities are also interested in what can be done differently on a broad scale to better align land uses/siting patterns with community needs and visions.

- **A need to consider cumulative impacts:** It is important to understand and take into consideration the cumulative impact of truck traffic and pollutants on already overburdened communities. Measurements for a specific manufacturer/industry, transportation

infrastructure improvement, or other single occurrence is not enough, as it does not address the cumulative impact of multiple actions on a community.

- **A need to monitor pollution locally:** Communities identify the need for air quality and overall pollution monitoring, given the negative health effects, high concentration of industries, and the current framework of measuring by individual business versus the cumulative effect of pollution by all businesses in a concentrated, condensed area.

- **A need to better manage issues associated with truck traffic:** Communities are experiencing high truck congestion on both arterial and other streets. Truck drivers may cut through residential streets due to congestion, viaducts, or directions from routing apps, contributing to the deterioration of infrastructure and creating problems for residents.

- **A need for community focused economic development metrics and information:** The opportunities in business corridors are usually framed from the perspective of jobs, economic benefits, and industry, while the costs are not fully considered or shared. Information on jobs and economic benefits should explicitly and realistically discuss long-term job type/wage/benefits, realistic opportunities for community members, and potential economic benefits realized by the community itself. Costs such as traffic and environmental impacts, which are most often felt by local communities, should be explicitly considered.

- **A need to improve visibility and information sharing:** It is sometimes difficult for community stakeholders to get information about what is happening or planned in the community. Data and information relevant to freight related decision making should be more easily accessible.

- **A need to better value community input:** Communities often report they are left out of decision making due to a lack of timely and productive opportunities to provide input. Community members recommend placing a greater weight on the community voice and making meetings and information accessible by utilizing strategies including:

  - In-language meetings and materials (i.e., meeting facilitation and materials presented in the predominant language(s) spoken in the neighborhood / community area).
  - Multiple meetings in the community during different times.
  - Incorporate into existing meetings of community organizations to provide information.
  - Gather input in various ways (e.g., listening sessions, surveys, attending existing community meetings).

3.2 A Conceptual Framework for Addressing Adverse Truck Impacts

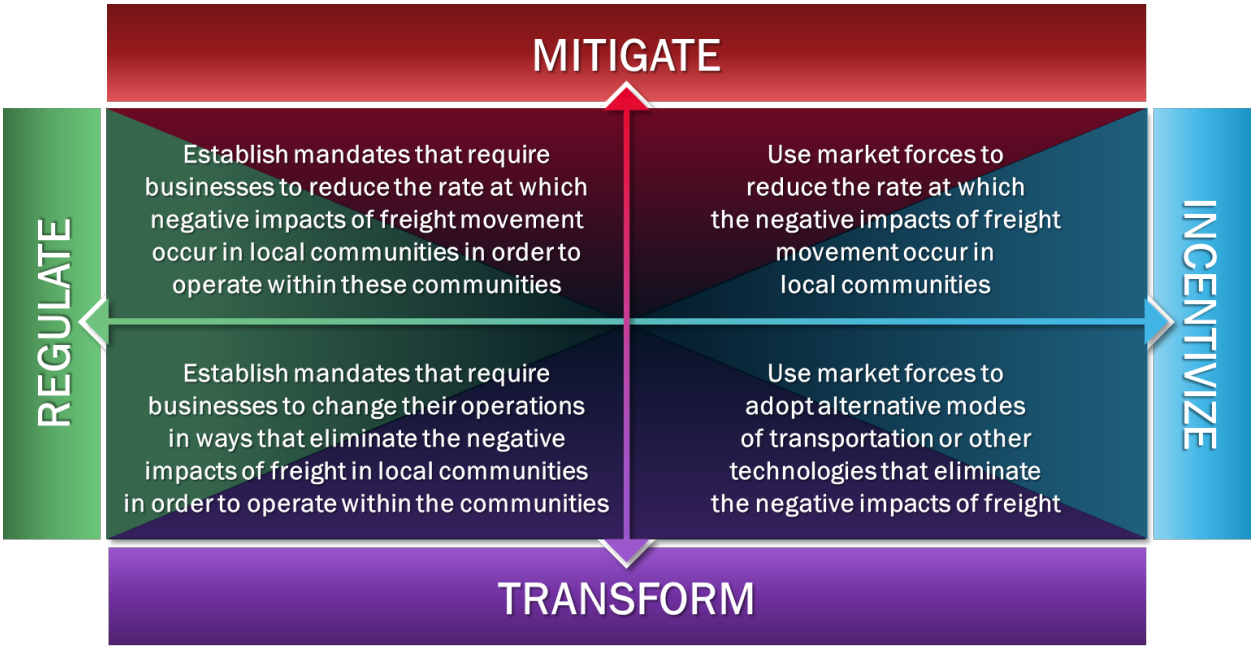
In approaching the “wicked problem” of truck traffic impacts, it can be useful to establish a conceptual framework that offers a spectrum of actions. Broadly speaking, this spectrum

represents the scale of improvements as well as the speed at which conditions will improve for those affected . This spectrum can be illustrated metaphorically by considering three types of strategies that a government agency can use to address the negative impacts of the wicked problem. These are as follows:

- **Source Removal:** Eliminate the negative impacts by removing the cause of the impacts (trucks) from the affected areas.
- **Source Reduction:** Reduce the rate at which the negative impacts occur by reducing the intensity or volume of externalities produced by trucks.
- **Source Repair:** Reduce the harm caused by the negative impacts by using tools that counteract or remove the externalities produced by trucks once those impacts have been generated.

A two-axis classification framework, shown in **Figure 16** may also be helpful to categorize potential strategies available to policy makers and help determine how changes may be designed and implemented.

Figure 16. Classification Framework for Strategies to Address Adverse Truck Impacts



One axis shows a spectrum between mitigation and transformation. Mitigation activities reduce the impacts of a negative externality (e.g., air pollution, noise, or safety risks caused by truck traffic) without changing the causes of these externalities. An example of mitigation could be the installation of pollution reduction devices, or “scrubbers”, in power plant exhaust systems to

remove pollutants such as sulfur dioxide (SO_2) from the exhaust streams. Transformation activities would reduce the negative externality by removing or changing the source of that externality. Replacing coal-fired power plants with wind or solar power would represent an act of transformation, as that would eliminate the process of coal combustion and thus eliminate the SO_2 emissions source.

The other axis represents a spectrum between using regulatory powers and incentives, both positive and negative. Regulatory power sets rules and requirements other actors must follow in order to engage in a particular activity. An example of regulatory action is the set of local and state laws that restrict smoking in certain areas to reduce the impacts of secondhand smoke. These smoking bans are enforced by public agencies to ensure compliance, with fines levied on violators. Conversely, incentives rely on market forces by changing the costs associated with different operating conditions, tools, or technologies, encouraging actors to adopt them independently in response to changes in costs or benefits. Cigarette taxes are an example of a negative incentive that have been implemented by many governments to reduce smoking by making it more expensive.

The two axes form a field, and solutions can be oriented along both axes in a spectrum relative to each other. That is, one solution may rely more regulatory power than other, or a solution may have both mitigatory and transformative effects. A strategy's orientation within this framework depends heavily on how the implementing agency chooses to design the solution. For example, an incentive-based strategy may rely on market forces, but a negative incentive, such as the aforementioned cigarette tax, may become more like a regulation if the tax is high enough that the taxed good or service becomes unaffordable.

It is important to note that this conceptual framework organizes strategies, but it does not prioritize them. Those determinations must be made by the policymaking entity outside of the framework based on available resources and staff capacity, jurisdictional and legal authority, the specific localized conditions where strategies are to be applied, and other factors. However, this framework is useful for responding to a wicked problem because it enables the policymaker to see the full array of tools at their disposal. Since a wicked problem cannot be addressed by a single solution, this conceptual framework helps organize choices for building a multi-pronged approach.

The application of a multi-pronged approach is seen in State DOT responses to road safety issues. Along state highways, flashing lights and electronic messages are used to catch drivers' attention and provide guidance on safe driving, such as speed limits, changes in the road's geometry, or weather information. The use of state highway patrols to ticket drivers for rule violations further emphasizes adherence to the rules by enforcing them through fines and fees on unsafe behavior. These messaging and enforcement strategies are designed to influence drivers to change their behavior voluntarily, representing a Mitigation/Incentive approach.

However, the voluntary behavioral changes can be reinforced by the infrastructure of the roadway, using barriers to separate directional traffic and installing rumble strips to alert drivers when they are departing the roadway. These infrastructure tools reduce or eliminate the conflicts on the road by disrupting unsafe behavior or placing physical separation between vehicles. These strategies are designed to transform the environment in which driving occurs, representing a Regulate/Transform approach. They are designed to complement each other, filling in gaps to improve safety through multiple vectors.

Even in this hypothetical framework, there are limitations of and trade-offs between strategies. As trucks have come to play an increasingly large role in the worldwide economy, they cannot be addressed simply by local agency action. Market-based and/or federal and state regulatory action is required to address the micro- and macro-economic trends and policy that led to the current system of trucks in the first place. For example, a local agency may incentivize the adoption of low- or zero-emission trucks and equipment through direct incentives for vehicle and equipment purchase, matching funds for federal or state grants, and technical assistance for transition planning under a Just Transition model.[31] For stricter emissions standards and/or zero-emission vehicle transition on a broad scale, federal regulatory action and/or equivalent scale market-based action would be required.

Table 6 provides an overview of potential strategies to address the impacts of trucks; aligns these strategies with the levers and tradeoffs; and identifies barriers to adoption. The following subsections provide additional details for a sample of these strategies to illustrate the application of the conceptual framework. These additional details include a strategy assessment which summarizes the tradeoffs; estimates of the efficacy, timeframe, and level of effort required; and identification of both key barriers and unintended consequences of action.

The intent of this research is to show a range of potential tools and strategies available to agencies, discuss applications of these strategies, give examples of where they have been implemented, and particularly identify challenges to implementation, either conceptual or from experience. This paper does not attempt to identify or categorize all possible responses or provide an implementation-ready action plan. Rather, the following sections provide a survey of a broad range of potential actions and their benefits and limitations in order to create a framework for public agencies to better understand what strategies might be available to them and what obstacles might need to be overcome in order to implement them.

[31] A Just Transition is a framework for economic development that accounts for the needs of all parties impacted by a transition in economic or industrial structures. A Just Transition in the trucking and warehouse industries could potentially include technical assistance, skill development, and workforce planning for workers at risk of displacement as low- and zero-emission vehicles and equipment are integrated into transportation and warehouse operations.

Table 6. Potential Strategies for Addressing Negative Impacts of Trucks

Conceptual Framework Alignment	Strategy	Type of Strategy	Tradeoffs Incurred by Strategy	Local Agency Ability to Implement Strategy
Regulatory	Street design and protected infrastructure	Source Mitigation	Equity, Community Engagement	High – planning and building infrastructure is within local agency authority
	Green/sustainable infrastructure design (e.g., increasing tree or vegetation coverage)	Source Mitigation	Equity, Community Engagement	High – trees, vegetation, and other sustainability measures are within local agency authority
	Air quality regulations	Source Reduction	Equity, Institutional Complexity, Monitoring and Performance, Community Engagement	Low – Regulatory authority is at state/federal level and requires significant coordination
	Idling regulations	Source Reduction	Equity, Enforcement	Medium – Some authority at local level, creative strategies can maximize limited resources for enforcement
	Requirements for vehicle technology such as in-vehicle alert systems or crash avoidance technology	Source Reduction	Institutional Complexities; Enforcement, Monitoring and Performance	Low – Regulatory authority is at state/federal level and requires significant coordination. Can be moderately effective as an incentive program.
	Truck routes and restrictions	Source Reduction	Equity, Land Use and Economic Development, Enforcement, Community Engagement	Medium – requires coordination and enforcement. May create “NIMBY” type implications.
	Land use and zoning restrictions for certain types of uses	Source Removal	Equity, Land Use and Economic Development, Community Engagement, Monitoring and Performance	Medium – while within the scope of local agency powers, land use and zoning restrictions are challenging to implement

Conceptual Framework Alignment	Strategy	Type of Strategy	Tradeoffs Incurred by Strategy	Local Agency Ability to Implement Strategy
	Leveraging the permitting process to require emissions or truck volumes to be below maximum thresholds for facilities	Source Removal	Equity, Land Use and Economic Development, Community Engagement, Monitoring and Performance, Enforcement	Medium – while within the scope of local agency powers, land use and zoning restrictions are challenging to implement. Monitoring and enforcement can be complex.
Incentivizing	Incentive programs for vehicle technology such as in-vehicle alert systems or crash avoidance technology	Source Reduction	Institutional Complexities, Enforcement, Monitoring and Performance	Medium – Slow adoption rates, challenging to ensure benefits of vehicle technologies are realized within a geographic area
	Air filtration or pollutant removal technology installation	Source Reduction	Institutional Complexities, Equity, Monitoring and Enforcement	Low – Emissions reduction programs require significant coordination and resources and are more effective at the state/federal level
	Clean energy purchase incentives	Source Reduction	Institutional Complexities, Equity	Medium – Local agencies can incentivize energy purchases, requires coordination with utilities and state agencies.
	Low- and zero-emission vehicles and equipment incentives	Source Reduction	Institutional Complexities, Equity, Community Engagement	Medium – Program effectiveness challenged by limited resources and long adoption periods.
	Brownfield redevelopment programs	Source Reduction	Land Use and Economic Development, Institutional Complexities, Equity, Monitoring and Performance, Community Engagement	Medium – Resource heavy and administratively burdensome requirements. Effective programs require low-impact future uses.

3.2.1 Regulatory Strategies

Regulatory strategies are perhaps the most common tools at the hands of public agencies to deal with the impacts of truck traffic, as they utilize regulatory powers directly granted to an agency to address impacts. Regulatory action can result in either mitigation or transformative effects. Strategies, such as truck routes or restrictions, may also be seen as transformative at the local level while having only a mitigating effect, or no effect at all, when measured at a broader scale. Three regulatory strategy examples are discussed below: street design, air quality regulations, and truck routing and restrictions. It should be noted that the first two case studies are generally approaches to reducing or removing impacts from not just trucks, but vehicular traffic in general.

Street Design and Protected Infrastructure

One common and effective approach to improving safety and reducing impacts of motorized vehicles (including trucks) on bike users is to install curb-separated or otherwise protected bike lanes. Protected bike facilities can be undertaken on various scales, from a one-off approach where facilities are built on individual roadways or corridors, or as a more strategic approach to planning and design for roadway projects where protected infrastructure is required under certain conditions (such as segments with high crash rates, high right-of-way widths, etc.) in order to physically separate bike facilities from other traffic.

The separation of infrastructure through protected bike lanes significantly reduces the risk of conflict between bikes and other traffic, but it does not eliminate this risk since intersections will likely still present situations where bicycles and other vehicles may come into conflict. Street design approaches vary in terms of whether they are considered mitigating or transformative solutions, with mitigating solutions consisting of minor improvements or minimal barriers in a protected bike lane, while heavier barriers along with bike-specific traffic signals or other intersection conflict-reduction improvements could be considered a transformative solution.

A comprehensive 13-year study of multiple municipalities around the US, conducted by researchers at the University of Colorado Denver and the University of New Mexico, found a significant reduction of road fatalities for all road users on streets that had protected bike lanes (Wesley E. Marshall 2019). The study centered on 12 cities and found that those streets with protected bike lanes had the highest mode share of people riding bikes as well as lower fatality rates for all road users, not just cyclists. As these cities built out protected bike lanes in the 2000s, fatalities fell by 38% in Chicago, 40% in Denver, nearly 50% in San Francisco, 60% in Seattle, and an astounding 75% in Portland.

In 2017, The Portland Bureau of Transportation (PBOT) Bicycle Advisory Committee shared plans for a two-way bike lane on North Greeley Avenue and was completed by 2020. The corridor was historically unsafe for bicycle riders, carrying 25,000 motor vehicles per day, with a high percentage of those being trucks (14 percent), and median speeds of nearly 60 miles per

hour. The North Greeley corridor also happened to be the most direct bike route connecting the populous St. Johns neighborhood to downtown. Following the DOT's Bikeway Selection Guide, PBOT to prioritized this route due to its high truck volume and the discomfort and safety risk they pose to bicyclists. (U.S. Department of Transportation Federal Highway Administration 2019). This project also approached funding in a unique way: the Portland City Council appropriated the $1,800,000 for the project via a Major Maintenance Set-Aside as well as a Heavy Vehicle Use Tax which was voter-approved from a campaign named Fixing Our Streets. The project hopes to reduce injuries and fatalities for all road users. The North Greeley Avenue adopts a design with a proven record of increasing safety – a cycle track with a physical barrier separating cyclists from motor vehicles.

Table 7 provides an overview of the type, tradeoffs, ability to implement, and potential for unintended consequences of this strategy.

Table 7. Street Design and Protected Infrastructure Strategy Assessment

Strategy Type	• **Source Reduction** or **Source Removal**: Strategy can significantly reduce conflict risks between bikes and trucks, but requires significant planning and infrastructure investment to deploy at a large scale. Specialized expertise and additional resources are needed to plan, design, build, and operate infrastructure.
Tradeoffs Faced by Strategy	• **Equity:** Bike infrastructure and other street design or improvement projects should be deployed equitably and not predominantly in neighborhoods with higher levels of bike traffic or business districts. • **Community Engagement:** Engaging community members in street design can reduce unintended consequences of strategy.
Local Agency Ability to Implement	• **High.** Local agencies have the authority and resources to design and implement roadway infrastructure solutions for roadways under their jurisdiction. However, agencies must still balance many potential uses and make tradeoffs between potential uses on limited right-of-way.
Potential for Unintended Consequences	• **Medium.** Installing hard infrastructure without careful planning and understanding of other factors, such as other roadway users, economic and community needs, may lead to underutilized bicycle facilities, which in turn may generate community resistance to building additional bicycle infrastructure.

Air Quality Regulations

There are a number of technologies that can help manage and improve air quality. Installation of air quality management tools and infrastructure, such as air filters, could be mandated as part of

permit approvals, or vehicle registrations. Public agencies as a whole have broad range to regulate business operations and vehicle standards to mitigate, reduce, or remove the negative externalities associated with these operations. However, air quality regulations are within the purview of state and federal agencies, and so almost any action, including at the local level, requires coordination of both regulation and enforcement between multiple agencies and jurisdictions, e.g., state or federal regulation and local enforcement.

There is broad precedent for agencies mitigating air quality through regulation of infrastructure and vehicles. For vehicle regulation, states can adopt two emission standards: those set forth by the California Air Resources Board (CARB) or by the US EPA. In the heavy-duty engine sector, the EPA and CARB standards have historically aligned. In recent years, however, CARB rules have imposed more stringent requirements on nitrogen oxide (NOx) emissions and diesel particulate filters than counterpart EPA regulations through multiple programs. While environmental agencies in other states do not have the regulatory powers granted to CARB, states or communities can advocate for adopting these standards, and seventeen states have mandated the transition from the EPA to the CARB standards. Most recently, CARB established the Advanced Clean Trucks program, requiring truck manufacturers to increase zero-emission trucks as a share of their sales and requiring large fleet operators to report on their fleet operations. New Mexico became the latest state on July 3, 2023, to adopt the stricter standards for medium and heavy commercial vehicles set forth in CARB's Advanced Clean Trucks program. The New Mexico Environment Department cited the potential for improved air quality by reducing NOx emissions by thousands of tons and other particulate matter (PM) by hundreds of tons.[32]

CARB has also sanctioned a unique approach in reducing NOx and diesel PM emissions associated with warehouse operations. The South Coast Air Quality Management District (SCAQMD) established the Warehouse Actions and Investments to Reduce Emissions (WAIRE) in May 2021 in an effort to regulate and improve air quality in the Los Angeles, San Bernardino, Orange, and Riverside Counties. The program creates a menu-based point system, whereby warehouse operators are required to earn a specific number of WAIRE points on annual basis through mitigation efforts. These efforts can include acquisition of zero-emission trucks in fleet, yard operations at warehouse facilities, installation of solar panels on warehouse property, and replacement of air filter systems in community facilities, among others.[33] SCAQMD estimates that the WAIRE Program will reduce warehouse-related emissions by 10 to 15 percent and yield public health benefits ranging from $1.2 billion to $2.7 billion over ten years.[34]

[32] New Mexico Environment Department. https://www.env.nm.gov/transportation/

[33] SCAQMD. "Proposed WAIRE Program Points Overview. 15 Apr. 2021. <https://www.aqmd.gov/docs/default-source/planning/fbmsm-docs/waire-program_points-overview.pdf?sfvrsn=10>

[34] South Coast Air Quality Management District. Second Draft Socioeconomic Impact Assessment for Proposed Rule 2305 and Proposed Rule 316. April 2021. <https://www.aqmd.gov/docs/default-source/planning/fbmsm-docs/pr-2305_sia_2nd-draft_4-7-21.pdf?sfvrsn=8>

In addition to advocating for transitioning to the stricter CARB standards, state and local agencies have opportunities to more rigorously enforce existing standards. Maricopa County in Arizona has an Air Quality Department that has long developed their own inspection and maintenance policies, ensuring vehicles of all classes comply with emission standards.[35] As the fourth most populous county in the nation, Maricopa County has published one of the most comprehensive set of Air Pollution Control Regulations with the aim of improving air quality. More frequent mandatory inspections in urban metropolitan areas are common throughout the nation, and when they are applied to heavy-duty vehicles, they can reduce the number of vehicles skirting the law with tampering such as illegal delete kits that remove diesel particulate filters.

The EPA issued an Enforcement Alert in December of 2020 regarding aftermarket defeat devices that “bypass or render inoperative required emissions control systems, resulting in significant increases in harmful air emissions” from motor vehicles and nonroad equipment. Counties and municipalities can cooperate with the Enforcement Alert and ensure that persons operating tampered vehicles or devices are caught and penalized during inspections.

Table 8 provides an overview of the type, tradeoffs, ability to implement, and potential for unintended consequences of this strategy.

[35] Maricopa County Air Quality Department. Maricopa County Air Pollution Control Regulations. https://www.maricopa.gov/DocumentCenter/View/7429/MCAQD-Compilation-of-Adopted-Rules-PDF?bidId=

Table 8. Air Quality Regulations Strategy Assessment

Strategy Type	• **Source Mitigation, Reduction, or Removal:** Regulatory approaches are often more effective for new infrastructure, vehicles, or technologies; it is challenging to regulate impacts from existing structures or vehicles. Administrative capacity needed for and complexity of implementing new regulations can be high; enforcement efforts have often historically not kept up with regulatory action. May be most effective when combined with incentivizing strategies.
Tradeoffs Faced by Strategy	• **Equity:** Air quality regulations are a broad-based strategy that are historically unable to target air quality in a particular community. • **Institutional Complexities:** Emissions regulation is power granted at the state and federal level; local municipalities and regions usually must use other tools such as zoning, permitting, or incentivizing new technologies to reduce emissions sources. • **Monitoring and Performance:** Due in part to strict regulatory requirements, monitoring of regulated emissions is challenging with limited agency resources and focuses on a few key indicators. • **Community Engagement:** Communities are heavily impacted by and interested in air quality. Communities can be a source of on-the-ground resources for monitoring (non-regulatory level), enforcement (reporting of violators), and partner to a local agency on other improvements (planting trees, reducing speeds, etc.).
Local Agency Ability to Implement	• **Low.** New regulatory action often requires a long timeframe and significant state or federal participation. Resources for air quality regulation-level monitoring and enforcement are in high-demand and often limited, even in areas with historic air quality challenges, although low-cost air quality monitoring sensors are becoming more common for non-regulatory uses.
Potential for Unintended Consequences	• **Medium.** Strict regulations may “lock in” solutions in a way that limit potential for further improvements

Truck Routes and Restrictions

Transportation agencies have regulatory authority to limit where trucks can travel through designating truck routes, implementing restrictions, or other tools. Agencies can also make investments in infrastructure, such as traffic calming measures or other geometric restrictions, to limit or discourage truck traffic on a certain type of roadways. The use of these authorities to reduce or remove truck traffic on a street or corridor represents a regulatory solution that can

transform a street or neighborhood, at least at a local level. However, without consideration of broader implications, the use of truck routes and restrictions may simply move the impacts from one location to another and potentially increase the concentration of negative impacts in certain areas.

Truck routing is a strategy that states, counties, and municipalities commonly use to manage truck traffic on corridors and discourage truck traffic in unsuitable areas. In Illinois, truck regulation and restrictions are also tied to roadway classification, with less restrictive use by trucks on Class I and Class II roadways,[36] and more restrictive or no use by trucks allowed on local roadways and boulevards. Local and state agencies in Illinois can also designate certain roads as truck routes to further indicate where trucks can or should travel, with the intent to prevent or minimize truck traffic in areas not suited to that activity. Illinois' and the City of Chicago's restrictions particularly focus on disallowing trucks from using neighborhood residential streets as thoroughfares due to concerns about traffic safety and congestion, as well as other impacts such as air pollution, and noise pollution.

While truck restrictions are frequently used, it is currently uncommon to prioritize directing trucks away from disadvantaged populations. Novel truck routing strategies, however, can leverage ITS technologies to mitigate the health impacts of diesel trucks in communities that are overburdened by truck traffic. A study published in 2022 in the journal *Transportation Research Part D: Transport and Environment* asserts that innovative navigation systems can use data from the transportation system to design routes that minimize truck fuel consumption or emissions instead of trip distance or time. The data used to inform these route designs can include location of sensitive facilities or concentrations of historically-disadvantaged populations. This "exposure-based routing" technique can minimize the total exposure of at-risk community members to truck emissions. This strategy was applied in two historically disadvantaged Southern California communities in an attempt to determine the efficacy of exposure-based routing; the study found that it was possible to identify routes within these communities that reduced community-wide exposure to tailpipe emissions by up to 50 percent while increasing average travel time by no more than 5 percent.[37]

Table 9 provides an overview of the type, tradeoffs, ability to implement, and potential for unintended consequences of this strategy.

[36] In Illinois, Class I roadways are interstate and tollway facilities. Class II roadways include state and local roadways with a minimum lane width of 11 feet. Class II roadways must be designated by their state or local government.

[37] Ji Luo, Chao Wang, Barry Wallerstein, Matthew Barth, Kanok Boriboonsomsin. 2022. "Heavy-duty truck routing strategy for reducing community-wide exposure to associated tailpipe emissions". Transportation Research Part D: Transport and Environment, Elsevier.

Table 9. Truck Routes and Restrictions Strategy Assessment

Strategy Type	• **Source Reduction or Removal (Local):** Strategy is limited by enforcement resources; Multi-use arterial roadways are often desired for truck traffic as well as serving as community connectors, thus concentrating truck activity along these corridors may worsen conditions for those who live, work, and/or travel there, even if broader scale impacts are minimized. These strategies are very commonly subject to NIMBYism or other community objections.
Tradeoffs Faced by Strategy	• **Equity:** Strategy can be effective to respond to the particularly heavy impacts of trucks faced by local communities by moving traffic away from sensitive or vulnerable uses and onto major arterials or other roadways. • **Land Use and Economic Development Patterns:** Industries and businesses that require high levels of truck traffic are often co-located with vulnerable or disadvantaged communities. Trucks can only be rerouted so much, as they will still need access to and from facilities. • **Enforcement:** Local and state agency enforcement resources must balance multiple priorities and needs. Community-led programs, such as the New York Citizens Idling Program[38] can be effective in helping reduce violations. • **Community Engagement:** Strategy responds to community dissatisfaction with truck traffic on local roadways; however, it may cause "NIMBYism" or similar conflicts, e.g., moving the problem from one unwelcome location to another unwelcome location.
Local Agency Ability to Implement	• **Medium.** Local agencies often have the power to identify truck routes and restrictions either on their own or in partnership with the state. However, truck routes do not remove or reduce the level of truck traffic at the regional level, and may concentrate the impacts within particular areas. Local agency planning, design, and community engagement are a critical component of effective truck route programs.
Potential for Unintended Consequences	• **High.** Redirecting truck traffic may put traffic pressures on the alternative corridors, concentrate impacts to nearby populations, or have other consequences such as increasing overall truck VMT. These may create more pollution in aggregate, or hinder the adoption of electric vehicles or alternative delivery systems due to increased trip length.

3.2.2 Incentivizing Strategies

Incentivizing strategies are a way for a public agency to entice other actors, most commonly private sector truck operators, to change their behavior, operations, or technology in order to see a reduction in truck impacts. These strategies can often work in partnership with regulatory strategies, serving as a "carrot" to the other type's "stick. Two case studies are shown below: incentives for low- and zero-emission fleets, and incentives for brownfield redevelopment. Low- and zero-emission fleet adoption strategies are a popular way that the public is working to increase the speed of adoption of these technologies, whether specific to trucks or for vehicle classes more broadly. However, these programs often have limited resources, and as such their impacts so far have been limited. Brownfield redevelopment strategies are focused on fixed infrastructure and land use, but have a number of potential applications in reducing or removing the impacts of trucks. These strategies have potential to have more wide scale reduction of impacts if similar programs were to be developed for heavy vehicle fleets.

Incentives for Low- and Zero-Emission Vehicles and Equipment

Low-emission and zero-emission vehicles could be incentivized for adoption in fleet operations through the provision of grants for vehicle purchase or the establishment of low-emission loading zones where low-emission and zero-emission vehicles receive preferential schedules for loading and unloading. Lowering the direct purchase costs or creating operational advantages for these vehicles incentivizes either public or private sector parties, or both, to reduce the emissions of their fleet. If implemented at a large scale, low- and zero-emission fleet adoption would be transformative; however, this would require large scale multi-state or federal action. Local or state level incentives represent a lower-scale solution, mitigating or reducing the impacts within a City or region.

While zero-emission vehicles are still an emerging technology, advances in electric trucks are creating expanded opportunities for fleet diversification. In August 2023, US-built electric mini-trucks from AYRO, an electric vehicle manufacturer, were designated by the US National Highway Traffic Safety Administration as street-legal low-speed vehicles.[39] While these vehicles may not replace the 18-wheeler tractor-trailers associated with warehouse logistics, they open up applications for localized freight movement that still could reduce truck-related emissions within neighborhoods.

The New York City Clean Trucks Program (NYCCTP) is a rebate incentive funding program to reduce diesel exhaust emissions by replacing older, heavy polluting diesel trucks with new battery electric, or EPA emission compliant alternative fuel (compressed natural gas, diesel-electric hybrid, and plug-in hybrid electric) and less-polluting diesel trucks.[40] The program

[39] Toll, Micah. "US-built electric mini-truck AYRO receives street-legal certification." *Electrek*. 23 Aug 2023. <https://electrek.co/2023/08/23/ayro-vanish-electric-mini-truck-receives-street-legal-certification/>

[40] NYCDOT. "NYC DOT in Partnership with the NYCDEC Announces Launch of the New York City Clean Trucks Program". https://www.nyc.gov/html/dot/html/pr2020/pr20-023.shtml

targets businesses that move goods and commercial truck owners operating within the program-approved New York City Industrial Business Zones (IBZs) and offers attractive rebate incentives for the purchase of new battery electric or EPA emission compliant alternative fuel and diesel trucks. NYCCTP was launched on June 3, 2020 as an expansion of a previous pilot program focused on replacing, retrofitting, and scrapping heavy-polluting diesel trucks from the South Bronx business communities.

Combined, the two programs boast a total of 659 truck replacements, 6 exhaust retrofits, and 24 voluntary scrappages resulting in a reduction of 408 short tons of NOx, 24 short tons of PM2.5, 30 short tons of hydrocarbons, 112 short tons of carbon monoxide, and 720,096 gallons of diesel fuel per year. Applicants for the rebate have included beverage distributors, construction and demolition equipment haulers, cement haulers, fuel delivery trucks, towing companies, food and produce distributors, and service vehicles for plumbing, gas, and electric sectors.[41]

The City of Santa Monica offered a different approach to encourage zero-emission vehicle adoption in truck movements with a Zero-Emissions Delivery Zone program. In response to the growth in food and online shopping deliveries during the pandemic, Santa Monica established a one-square mile area in its downtown area as a Zero Emissions Delivery Zone from January 2021 through December 2022. Electric vehicles and cargo bikes were designated as approved vehicles to use the Zone for last-mile delivery.[42] While no penalties were established for non-approved vehicles, the City partnered with an artificial intelligence company to record pick-up and drop-off activity to evaluate program effectiveness and inform future planning. While the pilot program has not been extended, its success has led the Los Angeles Cleantech Incubator, a funding partner for the pilot, to establish a Zero-Emission Delivery City Challenge for other cities to participate in for their local curb management efforts.[43]

The Port of Los Angeles and the Port of Long Beach have maintained programs to support zero emission goods movement at port facilities for several years. These programs offer incentives, technical assistance, and charging station access to drayage companies and truck fleet operators that adopt zero-emission truck technologies.

In 2022, both Ports entered into funding partnerships with EV technology providers and truck manufacturers to establish publicly-available, no-cost charging stations for electric drayage trucks that operate at the two facilities.[44] Additionally, both ports have awarded contracts to trucking companies for the purchase of electric trucks, which are required to substitute a

[41] New York City Department of Transportation. n.d. *Program Success.* https://www.nycctp.com/program-success/

[42] City of Santa Monica. Zero Emission Delivery Zone. https://www.santamonica.gov/zero-emission-delivery-zone#:~:text=The%20City%20created%20dedicated%20Zero,the%20spaces%20are%20being%20used.

[43] Descant, Skip. “Zero-Emission Delivery Takes Center Stage in New City Challenge.” 28 Aug 2023. *Government Technology*. https://www.govtech.com/fs/zero-emission-delivery-takes-center-stage-in-new-city-challenge.

[44] Carpenter, Susan. “Port of Long Beach announces electric truck, EV charging partnership.” *SpectrumNews1*. 13 Sept. 2022. <https://spectrumnews1.com/ca/la-west/transportation/2022/09/13/port-of-long-beach-announces-electric-truck--ev-charging-partnership.

minimum number of drayage trips per year to port terminals in order to achieve emissions reductions at these facilities.[45] These partnerships are seen as a critical component of demonstrating the efficacy of electric drayage trucks to operate at port facilities, as the short, predictable routes that drayage trucks travel between port facilities and warehouses represent ideal use cases for electric vehicle operations. These partnerships are also seen as playing an important role in transitioning the freight industry away from diesel vehicles in order to meet California's new regulations to ban the sale of new diesel vehicles by 2036 and to transition all trucks to zero-emissions trucks by 2042.[46]

Table 10 provides an overview of the type, tradeoffs, ability to implement, and potential for unintended consequences of this strategy.

[45] Rahman, Rakin. "Port of Los Angeles funds 22 zero-emission trucks." *Port Technology International.* 21 Dec 2022. <https://www.porttechnology.org/news/port-of-los-angeles-funds-22-zero-emission-trucks/>

[46] Lopez, Nadia. "California is first in world to ban new diesel trucks." *USA Today*. 1 May 2023. <https://www.usatoday.com/story/news/nation/2023/05/01/what-to-know-about-californias-ban-on-new-diesel-trucks-by-2036/70173221007/>

Table 10. Incentivizing Low- and Zero-Emission Vehicles and Equipment Strategy Assessment

Strategy Type	• **Source Mitigation, Reduction, or Removal (depending on type of program):** Incentives will expedite adoption, but small businesses may find that the incentives do not counteract the application administrative costs nor justify the upfront capital costs of replacing a functioning vehicle with a new, more expensive vehicle. Administrative capacity for incentive design, outreach and education, and technical assistance for targeted stakeholders will be needed.
Tradeoffs Faced by Strategy	• **Equity:** Ensuring that the benefits for vehicle-incentive programs accrue in particular geographies is challenging. Planning for incentive programs should include equity-focused considerations or metrics to ensure that benefits are realized by underserved communities. • **Monitoring and Performance:** Monitoring and performance metrics can be built into program and undertaken by recipients in coordination with administrative agencies.
Local Agency Ability to Implement	• **High.** Local agencies have broad ability to develop and implement incentive programs, though resources and funding are often a constraint to program effectiveness. Partnership between agencies, organizations, and the private sector can increase program scale and effectiveness. Partnerships at the federal/state/local level to combine regulatory and incentive-based approaches can increase rates of adoption.
Potential for Unintended Consequences	• **Medium.** Higher-than-expected interest in an incentive program may lead to an oversubscription of the program and a greater administrative burden for the agency that administers the program.

Incentives for Brownfield Redevelopment

Tax credits and grants for brownfield redevelopment could be used to restore former industrial facilities and other blighted areas to productive use. These funding and financing tools often require that a site developer remove the hazardous materials and substances from the site to ensure that the health risks caused by the previous uses are significantly reduced or eliminated. While these programs do not eliminate the potential of harm from future industrial land uses or developments, they reduce the risk of further harm from the targeted site. In some cases, these programs have resulted in transformation of previously hazardous land via cleanup and rehabilitation into productive land.

The existence of brownfield redevelopment incentives is a recognition that the legacy of polluting land uses still affects conditions today in ways that hinder development. Businesses may want to invest in an area, but its current conditions create too many costs to make redevelopment profitable; these incentives are an attempt to "recover the costs" of the externalities of industrial uses. The incentives lower the cost barriers to redevelopment, often providing tax benefits or grants applied to cleanup and rehabilitation costs, in order to make the redevelopment process "pencil out" for the private developers.

Brownfield mitigation and redevelopment incentives have historically been offered at the federal and state level by environmental protection agencies, including the Illinois EPA. The IEPA maintains a Revolving Loan Fund available for municipally-owned brownfields, providing low- and no-interest loans for environmental cleanup. Applicants must prepare a Remedial Action Plan to demonstrate how the site will be cleaned up to a degree that environmental conditions do not present a significant risk to human health or the environment.[47]

In the 1990s, the City of Chicago also established a Chicago Brownfields Pilot Program to redevelop abandoned, contaminated properties into green spaces, housing, and new commercial buildings. The Program used municipal General Obligation Bonds to leverage additional federal funding from US EPA brownfield programs and US HUD loan guarantees, enabling the City to pay for environmental testing on five former industrial sites and remediation activities on two of the sites.[48] This program ran until the early 2000s, but eventually lost its funding and was discontinued, despite maintaining a large portfolio of unremediated brownfields.

Table 11 provides an overview of the type, tradeoffs, ability to implement, and potential for unintended consequences of this strategy.

[47] https://epa.illinois.gov/topics/cleanup-programs/brownfields/funding.html.

[48] Chicago Metropolitan Agency for Planning. "Brownfields Redevelopment Strategy." May 2009. https://www.cmap.illinois.gov/documents/10180/47947/Brownfields+report.pdf/e0ff5a18-e60b-4a82-b0b2-d5a83ebf7b49.

Table 11. Incentivizing Brownfield Redevelopment Strategy Assessment

Strategy Type	• **Source Mitigation, Reduction, or Removal (depending on strategy):** Effective programs balance incentives for mitigation or removal of hazards with commiserate results. Too low or too high incentives may limit the program's effectiveness. Administrative capacity for incentive design, outreach and education, and technical assistance for targeted stakeholders can also help improve program success.
Tradeoffs Faced by Strategy	• **Land Use and Economic Development Patterns:** Strategy responds to historic distribution and impact of industrial facilities and other intensive land uses with rehabilitation of the land. The program must take care to ensure new uses do not repeat or exacerbate historical challenges, e.g., cleaning up a site only to allow development of a new polluting industry. • **Institutional Complexities:** Due to the complexities in regulation and implementation as well as the expense, funding and administration for brownfield programs often require coordination at the state, local, and even federal levels. • **Community Engagement:** Communities often have differing visions for local land uses, and successful redevelopment opportunities should reflect community input and needs.
Local Agency Ability to Implement	• **Medium.** Development eligibility for brownfield redevelopment tax credits often require that a site be designated as a brownfield by a state or federal regulatory agency, such as the US EPA; however, much of the local coordination and activities can be led by local agencies.
Potential for Unintended Consequences	• **High.** Rapid redevelopment of brownfield areas without community engagement may incentivize other freight-intensive uses, such as warehouses, that perpetuate economic and environmental harm even as they mitigate the specific legacy environmental risks. Even with the offer of financial and technical assistance, organizations must determine that redevelopment of the sites represent a worthwhile investment, which may be limited due to factors such as local disinvestment around sites with most need for remediation.

4.0 What Can Be Done?

Within the framework discussed in Chapter 3, there are potential opportunities for CDOT and other public sector agencies in Chicago to further reduce the impacts of trucks in local communities. While no individual solution singularly addresses all the challenges of truck traffic across the City's geographies and needs of various stakeholders, potential opportunities do exist to help mitigate, reduce, or remove impacts. In order to maximize its ability to reduce the impacts of trucks on City infrastructure, residents, and communities, any plan should involve multiple strategies simultaneously. This could include actions such as identifying means for technical support and funding for the deployment of air quality monitoring resources, as well as building or repairing the necessary physical infrastructure to improve safety and health goals. CDOT also has the authority to implement truck impact reduction measures such as streetscape design, truck access restrictions, or other infrastructure-related improvements that prioritize vulnerable road users and focus on community priorities.

Coordination between CDOT and other City agencies, including CDPH and CDPD, is necessary to implement and enforce holistic policies that collectively employ multiple strategies to more fully address public health and safety impacts. Local economic and land use policies can play a role in reducing truck impacts by placing requirements or limits on truck-generating businesses. Some potential options may include enhancing traffic forecasts with follow-up studies to verify the incremental and cumulative traffic impacts on a community, monitoring emissions and air quality impacts, and/or including and maintaining streetscape and vegetation treatments.

This section presents a set of 12 potential opportunities that the City could further explore to help address the negative impacts of trucks in Chicago communities. They were prepared in consultation with CDOT, CDPH, and CDPD, and informed by research from CNT and input from community organizations. Each opportunity attempts to addresses the various infrastructure, economic, and social factors that drive the issue of truck impacts at the community level. Some of the opportunities are continuations or expansions of existing programs, while others would represent new programs, policies, or investments.

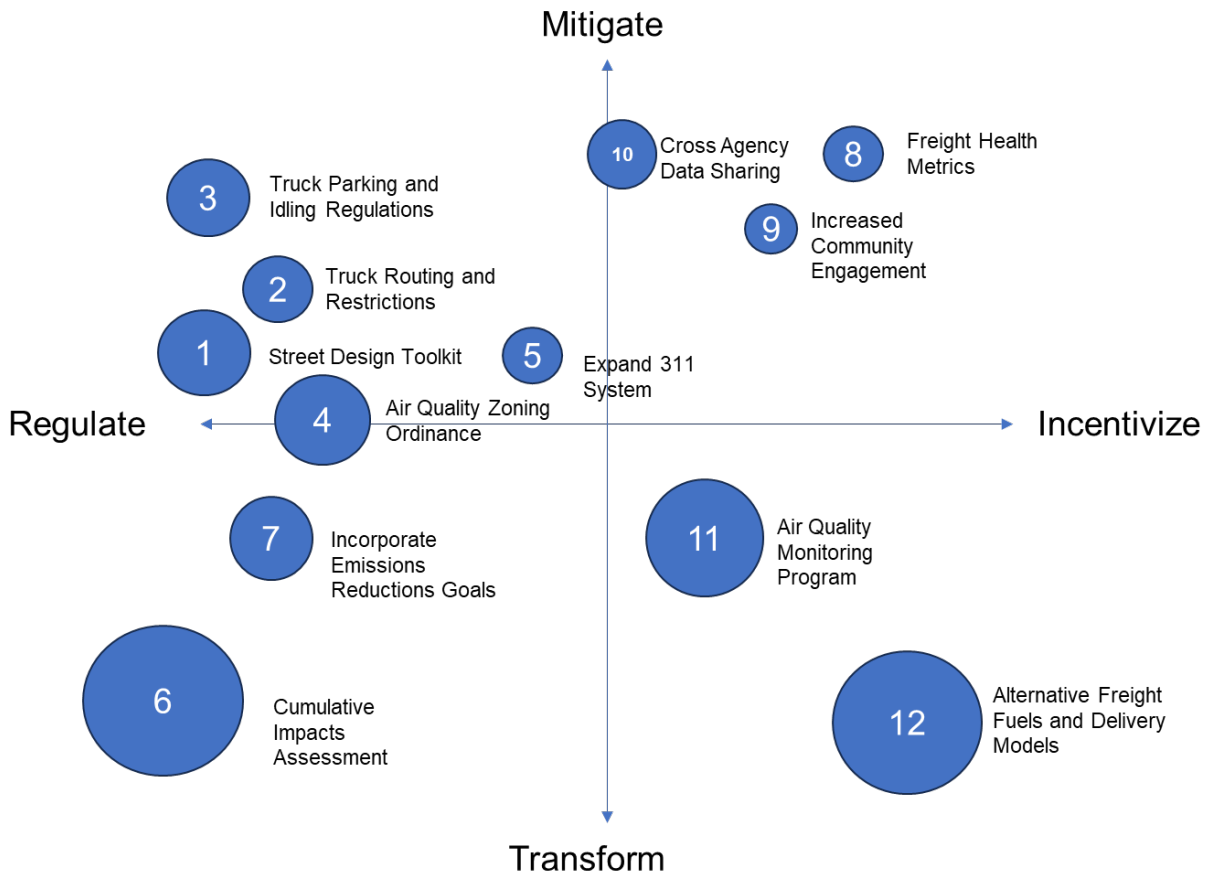
The 12 potential opportunities are briefly described in text form below, followed by a summary table (**Table 25**). In the summary table, relevant goals and objectives from *We Will Chicago* - Chicago's citywide plan - are also noted. For such a comprehensive and cross-jurisdictional effort as reducing the impacts of trucks, success will require collaboration between different agencies and cooperation on implementation of recommendations across a range of programs and disciplines.

4.1 Potential Opportunities Relevant to Chicago

This subsection details 12 potential opportunities for the City of Chicago to address the adverse impacts of truck traffic in its communities. **Figure 17** applies the two-axis framework from Section 2.2 to organize the recommendations and presents each opportunity in terms of its

ability to address the negative impacts of truck traffic in communities. As before, one axis represents a spectrum from mitigation strategies, which reduce impacts without fundamentally changing causes, to transformation strategies, which seeks to remove or change the cause entirely. The other axis represents a spectrum from regulation strategies, which mandate certain behaviors or actions, to incentive strategies, which encourage action by others to achieve similar aims. The size of each circle in the figure represents the potential effectiveness that the opportunity may have in addressing the adverse impacts of trucks. The practical effectiveness of any opportunity will be dependent on numerous factors, including agency resources, program or policy design, implementation timeframe, and others.

Figure 17. Potential Opportunities to Reduce Adverse Impacts of Trucks on a Two-Axis Framework



While there may be overlap between the different quadrants (e.g., a particular strategy might be considered mitigation or transformation depending on the scale of its implementation), the potential opportunities are organized by quadrants based on their most likely combination of being regulation or incentive-based and with expected mitigation or transformation outcomes. However, it is important to note that each potential opportunity represents a different balance of the framework's four poles, and its placement in this framework reflects its use of these

components relative to all other opportunities. This is a spectrum of several actions rather than a set of assignments to discrete categories.

The twelve opportunities shown in **Figure 17** are discussed below with brief discussions of how they may be implemented, what actions could be taken in the City of Chicago, and other considerations for agencies responsible for implementation. **Table 25** summarizes the opportunities and identifies preliminary timelines and actions for implementation, as well as alignment with *We Will Chicago.*

4.1.1 Regulatory/Mitigation Opportunities

Regulatory/Mitigation opportunities leverage the authority of the City ordinances, policies, and programs to reduce the impacts of trucks on residents and communities. These opportunities can typically be implemented by the City without action by private entities, though coordination with communities and industry is recommended.

1. Freight-Impact Reducing Street Design

CDOT has numerous tools that can be used to help mitigate and reduce the impacts of freight movement on high-volume freight corridors within its communities. Similar to CDOT's *Complete Streets* program, a Freight Impacts Toolkit could offer a wide variety of best practice strategies that can be implemented either as part of a street design project or on an individual basis based on the specific types and intensities of freight impacts affecting the area. This toolkit could include (but may not be limited to) solutions related to bicycle and pedestrian infrastructure, green infrastructure, traffic calming infrastructure, and other tools and techniques that can increase pedestrian and bicycle visibility, provide separation between different transportation modes, and reduce travel speeds. This type of handbook can be particularly valuable for addressing freight impacts on complex and heavily used mixed-use corridors, such as 31st St. in Little Village, where freight, pedestrian, bicycle, and vehicular traffic intersect continually (see case Study in Appendix D).

This study's recommendations, the work done by CNT and neighborhood organizations (see Appendix B), and the policy recommendations identified in the *We Will Chicago* Transportation and Infrastructure Goals and Objectives and the Environment Climate and Energy Policies, can serve as a framework and starting point for this toolkit. The strategies and actions identified in these documents can be expanded upon and framed in terms of implementation, including causes, strategies/actions, costs, timeframe, resources needed, process, and outcomes. Best practice design guidance from other cities, such as Portland[49], should also be considered.

When approaching a truck-related issue in a mixed-use corridor, CDOT and its partners can leverage the toolkit to provide a "jump start" on planning and/or implementation. At the planning stage, the toolkit can serve as a resource for the City to identify and evaluate solutions, as well

[49] https://nacto.org/docs/usdg/designing_truck_movements_large_vehicles_portland_portland.pdf

as to help inform and engage stakeholders and community residents on needs assessment and solution design.

Table 12 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

Table 12. Potential Actions and Considerations for Opportunity 1

Opportunity			Timeframe
1. Freight-Impact Reducing Street Design			**Medium-Long**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Conduct a national review of best practices in truck-inclusive and Complete Streets design and update the Chicago Street Design Guidelines to incorporate best practices in minimizing truck impacts on multi-use corridors	◔	• Land Use and Economic Development Patterns • Monitoring and Performance	◔
• Incorporate street design to mitigate truck impacts by minimizing conflict points between trucks and vulnerable road users (*We Will Chicago* Transportation and Infrastructure Objective 3.1)	◕	• Land Use and Economic Development Patterns • Monitoring and Performance	◑
• Where appropriate, increase ped/bike infrastructure, expand tree planting along multi-use corridors (*We Will Chicago* Transportation and Infrastructure Objectives 3.1 and 3.2, Environment Climate and Energy Objective 4.4)	◕	• Land Use and Economic Development Patterns • Community Engagement	◔
• Develop and promote alternative freight routes to reduce through-truck use on key neighborhood corridors	◑	• Enforcement • Monitoring and Performance	◑

Opportunity			Timeframe
1. Freight-Impact Reducing Street Design			**Medium-Long**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Build upon the SWICTS study to conduct a comprehensive review of key multi-use corridors in disadvantaged communities; identify and implement context-sensitive solutions to reduce the impacts of freight	◑	• Equity and Use of City Resources • Monitoring and Performance	◑

2. Truck Routing and Restrictions

Truck restrictions are a tool for limiting the areas in which trucks traverse, primarily in residential zones, near sensitive areas such as schools or hospitals, and where roadway geometry or other physical limitations do not allow for safe truck travel. Truck routes provide either required or recommended safe paths for trucks and reduce the risk of trucks getting lost or taking routes that are not designed for trucks. Along with truck routes and restrictions, clear signage and policies regarding truck use enhance the ability of public agencies to ensure that reality matches the planned system. Finally, navigation apps should reflect these restrictions and recommendations to avoid directing drivers onto inappropriate streets.

Identifying and implementing truck routes is typically done in partnership between municipalities and the Illinois DOT. IDOT currently keeps a public map of state truck routes on its website, which is the primary repository of this information for the state.[50] Truck restrictions are typically designated by ordinance. CDOT is responsible for truck route and restriction signage and has served as a coordinating agency for truck route policies and implementation. The Chicago Department of Business Affairs and Consumer Protection (BACP), Chicago Police Department, and Illinois State Police share enforcement authority, depending on the specifics of a particular infraction.

There are numerous tradeoffs that may occur with designating truck routes and restrictions. Chicago has a limited number of arterial and highway corridors that must be shared between multiple users, including people using trucks, automobiles, transit, bikes, and sidewalks and pedestrian crossings. The City also has numerous obstacles to truck movements, including low clearance viaducts and reduced weight bridges, that limit truck movements on some key routes. There are numerous community considerations to take into account when designating truck routes, including equity and fairness. As described in this report, truck-intensive industries and

[50] https://www.gettingaroundillinois.com/MapViewer/?config=DTRconfig.json

facilities are more likely to be located within underserved areas of the City, and thus these communities are more heavily burdened by trucks and have fewer potential truck restrictions. Finally, the State of Illinois and City of Chicago have numerous laws and regulations regarding truck movements; however, not all of these are enforceable given resources of enforcement agencies.[51]

CDOT does have several ongoing tools and priorities related to truck routes and restrictions, such as the Truck Works Advisory System. A policy idea identified through the *We Will Chicago* planning process is to implement truck route technology upgrades to monitor volumes and movements, inform traffic management operations, and identify locations necessitating improvements. CDOT also prioritizes addressing truck cut-through activities on residential streets or others where trucks are not wanted/warranted through a combination of policies and infrastructure, such as curb design or medians on entries into residential streets. The City can also continue to identify tactical opportunities for meaningful truck restrictions in areas that will solve a specific impact while having minimal or mitigatable impacts on the rest of the system, such as restricting trucks from cutting through specific residential or commercial areas with heavy pedestrian traffic, unless they are traveling to or from a location within the area.

Table 13 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

Table 13. Potential Actions and Considerations for Opportunity 2

Opportunity			Timeframe
2. Truck Routing and Restrictions			**Short**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Upgrade technology along truck routes to monitor volumes and movements of all modes, inform traffic management operations, and identify locations necessitating improvements (*We Will Chicago* Transportation and Infrastructure Objective 3.1)	◑	• Institutional Complexities • Monitoring and Performance	◑
• Leverage the Chicago Truck Works Advisory System	◑	• Enforcement • Monitoring and Performance	◔
• Work with IDOT to update the City's designated truck route system where appropriate	◑	• Institutional Complexities	◑

[51] For example, the prohibition on 53' trailers in the City of Chicago has historically not been enforced.

Opportunity			Timeframe
2. Truck Routing and Restrictions			Short
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Work with IDOT and GPS vendors to ensure up to date truck route and restriction data are available on common platforms	◑	• Institutional Complexities • Monitoring and Performance	◔
• Address truck cut-through activities on residential streets or others where trucks are not wanted/warranted through policies or infrastructure	◑	• Enforcement • Monitoring and Performance	◑
• Incorporate community-led and equity considerations in truck route identification in and near disadvantaged communities	◕	• Equity and Use of City Resources • Community Engagement	◕
• Identify tactical opportunities for meaningful truck restrictions	◑	• Equity and Use of City Resources • Monitoring and Performance • Community Engagement	◑

3. Illegal Truck Parking and Idling

Since 2009, diesel vehicles in Chicago have operated under an ordinance limiting idling to three minutes per hour, with some exceptions (see Section 9-80-095 of the Chicago Municipal Code.) This is stricter than the state standard of ten minutes, and means that diesel vehicles, including trucks, are not allowed to stand with their engines running for more than three minutes while delivering, waiting, or performing other functions. The purpose of this ordinance was to reduce air pollution from diesel exhaust and to promote fuel conservation. The City also has a prohibition on visible emissions, which is a sign of an improperly functioning or poorly designed exhaust system.[52] In Chicago, trucks are also not allowed to park on residential streets, or on

[52] https://www.chicago.gov/city/en/depts/cdot/supp_info/doing_our_share_forcleanerairidlingreduction.html

business streets while they are not providing services.[53] Parking trucks on city streets creates congestion and safety hazards.

Greater and more targeted enforcement of these regulations, particularly in areas of the City experiencing poorer air quality and health outcomes, is an important step. According to the Chicago Municipal Code 9-80-095, the idling law can be enforced by Department of Public Health (CDPH) inspectors, traffic control aides, parking enforcement aides, and police officers.[54] Enforcing regulations on vehicles can be challenging with limited resources, but there are opportunities to increase compliance and improve outcomes, including education of enforcement personnel, implementing specific enforcement goals related to these issues, or increasing fines or penalties for violators.

The City could also ensure that fines are being charged to companies and facility owners rather than truck drivers and operators, although this would require a revision of the current Municipal Code.[55] Charging owners rather than drivers allows for heavier fines to be assessed without financially burdening individual workers, and puts the enforcement penalty on the equipment owner and policy maker, who has the responsibility and resources to ensure that vehicles are meeting the City standard.

One important step to reducing truck parking violations is to ensure that adequate parking facilities are available to trucks. However, like any facility with heavy truck traffic, truck parking facilities can create congestion, safety, air quality, as well as an array of environmental hazards. For example, truck movements at unpaved truck yards generate large amounts of dust and track-out, which are additional sources of particulate matter pollution. The City has a role in ensuring that all facilities serving trucks, whether a manufacturing/warehouse facility or a parking lot, do not create more challenges than they solve. The City may use its zoning powers and tools, such as the Air Quality Zoning Ordinance and/or the Cumulative Impacts Ordinance, to ensure that truck parking is compliant with regulations and not creating additional harm. Truck parking facilities can be lucrative for business owners, but these economic benefits should not come at the cost of community well-being.

Chicago could also consider developing a Citizens Air Complaint program that allows witnesses to submit evidence of parking or idling violations and collect a portion of the fine. In 2019, New York City implemented a similar program, which allows people to submit a complaint using an

[53] https://www.chicago.gov/dam/city/depts/rev/supp_info/ParkingBrochure/Parking%20Your%20Commercial%20Truck%20in%20Chicago%20Brochure.pdf

[54] From 9-90-095: Any police officer, traffic control aide, other designated member of the police department, parking enforcement aide or other person designated by the city traffic compliance administrator, the commissioner of health, or the commissioner of transportation shall have authority to enforce the provisions of this section.

[55] From 9-64-220: Whenever any vehicle is parked in violation of any provision of the traffic code prohibiting or restricting vehicular parking or standing, any police officer, traffic control aide, other designated member of the police department, parking enforcement aide or other person designated by the Traffic Compliance Administrator observing such violation may issue a parking violation notice and serve the notice on the owner of the vehicle by handing it to the operator of the vehicle, if he is present, or by affixing it to the vehicle in a conspicuous place.

online system or the 311 program.[56] As of March, 2022, New York City reported collecting $2.4 million since the program started, and citizen reporters have collected $724,000. Reports of violations increased 35 percent over the first year of the fine-sharing program.[57]

Table 14 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

Table 14. Potential Actions and Considerations for Opportunity 3

Opportunity			Timeframe
3. Truck Parking and Idling			Short
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Increase fines for parking/idling violations and charge to the company/owner, not individual workers	◑	• Land Use and Economic Development Patterns • Equity and Use of City Resources • Enforcement • Monitoring and Performance	◑
• Ensure truck parking facilities are not creating neighborhood harm; facilities may be subject to the considerations of the Air Quality Zoning Ordinance, Cumulative Impact Assessment and Ordinance, and other pertinent regulations for truck-intensive facilities	●	• Land Use and Economic Development Patterns • Equity and Use of City Resources • Enforcement • Monitoring and Performance	●
• Update the 311 system to facilitate community member communication with the city for truck parking and idling violations. (see opportunity 5)	◑	• Equity and Use of City Resources • Enforcement • Monitoring and Performance	◔

[56] https://www.nyc.gov/site/dep/environment/idling-citizens-air-complaint-program.page

[57] https://www.cnbc.com/2022/03/31/make-87point50-in-3-minutes-by-reporting-idling-trucks-in-new-york-city.html

Opportunity			Timeframe
3. Truck Parking and Idling			Short
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Work collaboratively with CPD and/or other enforcement agencies to identify opportunities for streamlining or enhancing enforcement opportunities in sensitive locations	◑	• Equity and Use of City Resources • Institutional Complexities • Enforcement	◔
• Adopt a Citizens Air Complaint program allowing witnesses to submit evidence of parking or idling violations and collect a portion of the fine levied on the operator or owner (modeled on NYC program)	◕	• Equity and Use of City Resources • Enforcement • Monitoring and Performance	◕

4. Air Quality Zoning Ordinance and Sustainable Development Policies

The City has recently applied the findings of the Air Quality and Health Index report to a series of multi-agency regulatory reform and rulemaking efforts. These reforms have included new rules for air and noise assessment and monitoring,[58] as well as a new Air Quality Zoning Ordinance for managing air quality and traffic for manufacturing facilities, freight terminals, warehousing and storage, recycling facilities, and other uses.

As part of CDPD's site plan review and approval process for these land uses, a business must submit an air quality impact study to be reviewed by CDPH and a traffic impact study to be reviewed by CDOT. The traffic impact study evaluates AM/PM peak-hour traffic counts and 24-hour traffic counts prepared by the applicant; these counts are generally based on trip generation rates identified in the Institute of Transportation Engineer's Trip Generation Manual. The air quality impact study models potential emissions from the businesses and their proposed operations using approved modeling software, such as the U.S. EPA's AERMOD and EPA MOVES, as well as the findings of CDOT's trip generation estimates.

Applicants must submit both a written report and data files for review and comparison against existing background air pollution levels and regulatory limits. CDOT and CDPH are empowered to make recommendations for adjustment and approval to the CDPD Zoning Administrator,

[58] In June 2020, the City of Chicago updated its rule for large recycling facilities designed to reduce dust and pollution caused by these facilities. See: https://www.chicago.gov/content/dam/city/depts/cdph/InspectionsandPermitting/CDPH%20Rules%20for%20Large%20Recycling%20Facilities_Issued%20June%205,%202020.pdf.

although these recommendations take the form of opinions, not requirements. However, departmental authority to demand revisions to the underlying analyses are more limited, and the relative recency of the Air Quality Zoning Ordinance means that the departments have not yet encountered an application that used an analytical approach with which the departments disagreed.

Similarly, the Air Quality Zoning Ordinance aligns with IEPA permitting processes that require additional air quality impact analyses when incremental air pollution volumes exceed certain thresholds, but to date, no reviewed development has had sufficiently high pollution to trigger these conditions. CDPH does reserve the right to revisit the findings of its air quality impact studies if operations at the approved site change, but there is no tracking system for monitoring operations at this time.

The City could also build on these efforts and leverage the Chicago Environmental Justice Index, which was developed by CDPH as part of the Chicago Cumulative Impacts Assessment. The Index is a revised and updated version of the Air Quality and Health Index, expanded to include a broader array of criteria that reflect public health and environmental issues. It could also be beneficial to make the information in the Index more accessible and relevant to stakeholders, including City agencies and community organizations. These accessibility efforts could include planning for data visualization and interpretation, including explanatory and engagement materials, such as webinars or community meetings. These steps are aligned with the identified next steps of the Chicago Cumulative Impacts Assessment process.

Additionally, the City could incorporate the Index findings into decision-making processes. Indicator values of air pollution exposure and public health issues could be used to inform the identification of community needs and the selection of projects or policy reforms, particularly for Vision Zero initiatives and other projects related to bicycle/pedestrian safety and/or traffic calming programs.[59] The widespread adoption of the Chicago Environmental Justice Impacts Index findings would require coordination between CDPH and other City departments, including CDOT and CDPD, to determine procedures for accessing and interpreting the Index data. CDPH would also have to establish procedures for updating and managing the Index on an on-going basis to keep information current.

Table 15 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

[59] Accounting for or addressing air pollution risks in any project that is designed to improve conditions for walking and biking – modes that expose people to greater air pollution – ensures that the project creates benefits along multiple vectors for its users.

Table 15. Potential Actions and Considerations for Opportunity 4

Opportunity			Timeframe
4. Air Quality Zoning Ordinance (AQZO) and Sustainable Development Policies			**Ongoing**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Develop industrial site design guidelines, including vegetative buffers and green stormwater installation (*We Will Chicago* Transportation and Infrastructure Objective 3.2, Environment Climate and Energy Objective 4.5)	◕	• Land Use and Economic Development Patterns • Institutional Complexities • Monitoring and Performance	◑
• Periodically review process and outcomes for the AQZO, including the Traffic Study and Air Quality Study to ensure alignment with City goals	◕	• Institutional Complexities • Monitoring and Performance	◑
• Review opportunities for leveraging the CDPD Sustainable Development Policies for mitigation of impacts at truck-generating facilities	◕	• Land Use and Economic Development Patterns • Institutional Complexities • Monitoring and Performance	◑
• Establish on-site air quality monitoring requirement for construction projects as part of permitting process	●	• Enforcement • Institutional Complexities	●

5. 311 System

Chicago's citywide plan, *We Will Chicago*, provides a mandate to address gaps in the functionality and use of the 311 system. *We Will Chicago* establishes equity and resiliency as guiding principles, and challenges the City departments to enact policies that correct for historical systemic inequities. 311 System criteria for Service Requests should be expanded to include more explicit references to truck impacts in communities. These criteria could include options to report heavy emissions and/or low air quality in areas of heavy truck traffic, truck idling or standing, improper emissions from a moving source, dangerous turns or near-misses for cyclists and pedestrians, and improper loading/unloading activities and/or unsecured cargo.

Criteria should be developed with sufficient detail to help residents describe the exact impacts of freight movement and to help City departments identify potential solutions for implementation.

The City could also expand outreach and engagement to south and west side communities that experience a disproportionate burden of truck traffic and air pollution in order to increase familiarity with and use of the 311 system. This can also be an opportunity for education and engagement related to other 311 system options, such as tree planting or removal, sign repair, improper use of sidewalks by businesses, and other public way and transportation related issues. The outreach and engagement could include coordination with community organizations to facilitate workshops on how, when, and why to use the 311 system, and what to expect from the City in terms of SR response timing.

Table 16 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

Table 16. Potential Actions and Considerations for Opportunity 5

Opportunity			Timeframe
5. 311 System			**Short-Medium**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Update 311 system to include truck impact specific categories, such as emissions/air quality concerns, heavy congestion, non-emergency safety and security issues such as inadequate infrastructure, etc.	◑	• Equity and Use of City Resources • Enforcement • Monitoring and Performance	◔
• Conduct outreach to educate residents and increase engagement with 311 system in underrepresented communities	◑	• Equity and Use of City Resources • Community Engagement	◔

4.1.2 Regulatory/Transformative Opportunities

Similar to the previous category, Regulatory/Transformative opportunities leverage the authority of City ordinances, policies, and programs to reduce the impacts of trucks on residents and communities. However, transformative opportunities take an additional step to remove or change the root causes of the problems and may require higher levels of effort as well as have potentially greater long-term impacts. These opportunities can typically be implemented by the City without action by private entities, though coordination with communities and industry is advised.

6. Cumulative Impacts Assessment

In September 2023, Chicago released the Cumulative Impacts Assessment (CIA), including findings and recommendations on how to provide data on environmental burdens across the city.[60] Led by CDPH, the CIA describes environmental, health and social stressors in Chicago and identifies neighborhoods that experience the greatest impacts; it is intended to inform decision-making in policy areas such as land use/zoning, transportation, permitting, enforcement, and more. A recommendation of the CIA is to develop and enact a Cumulative Impact Ordinance (CIO), a duly legislated regulatory framework for integrating cumulative impacts into zoning and permitting processes.

CDPH utilized multiple City-wide Working Groups to address different components of the CIA, including Communications and Engagement, Policy, and Data & Methods. Working Groups were co-led and co-designed by CDPH and environmental justice community organizations. Representation on the Working Groups included other city departments. The involvement of these groups ensured that the CIA could address the priorities and concerns of the community using the full scope of tools available to the City while maintaining alignment with state and federal requirements for air quality regulation.

The purpose of the CIA is to establish a broad-based regulatory scheme tied to zoning approvals that looks to improve environmental conditions, public health, and social mobility. This framework represents an expansion of the Air Quality and Health Index to identify additional metrics, develop comprehensive “Environmental Justice maps” that reflect the full spectrum of issues, and target policy interventions towards burdened neighborhoods. The focus on zoning gives the City greater local control over the regulatory framework due to the high level of discretion given to local governments to regulate nuisances and other quality of life impacts. The CIO, if adopted, would establish new governance structures, authorities, and resources to more fully protect neighborhoods from the impacts of environmental burdens.

The next steps identified in the CIA include advancing proposed city policy and implementing practice changes, gathering additional quantitative data and developing a public facing dashboard, and continued community engagement. Various City departments should work cooperatively to incorporate the findings of the CIA, and the CIO, if developed, to inform zoning regulations, amend city policies and procedures to utilize the broader array of Environmental Justice metrics and identify strategies to build and manage the existing emissions inventory to support the CIA and CIO.

Table 17 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

[60] https://www.chicago.gov/city/en/depts/cdph/supp_info/Environment/cumulative-impact-assessment.html

Table 17. Potential Actions and Considerations for Opportunity 6

Opportunity			Timeframe
6. Cumulative Impacts Assessment			**Ongoing**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Implement the Cumulative Impacts Assessment	●	• Land Use and Economic Development Patterns • Institutional Complexities • Monitoring and Performance	●
• Identify key environmental metrics and establish a baseline in the City, particularly overburdened or underserved communities (*We Will Chicago* Environment, Climate and Energy Objective 2.4)	●	• Community Engagement • Monitoring and Performance	◑
• Establish targets for positive outcomes in communities that are environmentally overburdened	●	• Land Use and Economic Development Patterns • Institutional Complexities • Community Engagement • Monitoring and Performance	◑
• Implement policies and/or processes to minimize impacts of freight	◕	• Land Use and Economic Development Patterns • Institutional Complexities • Monitoring and Performance	◑
• Identify roles and responsibilities for City agencies for regulation and enforcement	◑	• Institutional Complexities • Enforcement • Monitoring and Performance	◔

Opportunity			Timeframe
6. Cumulative Impacts Assessment			**Ongoing**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Enact a Cumulative Impacts Ordinance that codifies requirements into the City Municipal Code	●	• Land Use and Economic Development Patterns • Institutional Complexities	●

7. Emissions Reduction Goals in Transportation Planning and Programming

In addition to the opportunities laid out by the Cumulative Impacts Assessment, Chicago can take steps to formalize the linkages between transportation and emissions. *We Will Chicago* recommends establishing equity-related metrics in project development and evaluation processes for transportation and infrastructure projects *(We Will Chicago* Transportation and Infrastructure Objective 4.3*)*. Explicitly linking the Air Quality and Health Index and transportation planning and programming may be an effective way to start addressing this objective.

This action, while novel at the City level, would be in line with state and regional goals for emissions reductions. Illinois has committed to implementing policies around infrastructure investment that reduce greenhouse gas emissions by 26 to 28 percent below 2005 levels by 2025, as stated under the United Nations' Paris Agreement.[61] The Climate and Equitable Jobs acts will also require Illinois to phase out fossil fuels in the power sector by 2045, and provide support for electrification of the state's transportation infrastructure.[62] Many actions that reduce greenhouse gas emissions also reduce emissions that contribute to lower air quality, and thus can bring alignment between State and City goals.

As arbiter of the Congestion Mitigation and Air Quality (CMAQ) funding provided by the USDOT, CMAP has traditionally been the agency most responsible for ensuring that investments help meet air quality goals. Emissions reductions are incorporated into scoring procedures for CMAQ projects, and the agency is also exploring additional, more quantitative metrics for incorporating impacts of transportation projects. The City should look to build upon the frameworks used by CMAP when making its own decisions related to consideration of impacts.

Chicago could also look to national best practices in incorporating impacts of transportation projects. In July 2022, the Colorado Department of Transportation established a Nonattainment

[61] https://www.illinois.gov/government/executive-orders/executive-order.executive-order-number-6.2019.html

[62] https://www.nrdc.org/bio/jc-kibbey/illinois-passes-nation-leading-equitable-climate-bill

Area Air Pollution Mitigation Enterprise (NAAPME) following an act of legislation that raised fees on Transportation Network Companies (TNCs, such as Uber and Lyft) and retail deliveries to address traffic congestion and reduce environmental and health impacts. The NAAPME receives funds generated by these fees for investment in Colorado's nonattainment areas, which cover nine counties in the state, in order to address air quality issues and bring these areas into compliance with EPA requirements. These investments must address three focus areas: projects that sustainably reduce traffic congestion; projects that reduce the environmental and health impacts of transportation; and projects that improve connectivity for communities adjacent to highways.[63]

While the criteria for project and program selection have not been made publicly available as of April 2023, Colorado DOT has requested funding from the NAAPME to build an air quality monitoring and mitigation program for state highway projects in order to collect air quality data on construction activities.[64] These data are intended to be used to evaluate mitigation activities in construction projects for future investment decisions for construction projects and for mitigation activities.

Table 18 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

Table 18. Potential Actions and Considerations for Opportunity 7

Opportunity			Timeframe
7. Emissions Reduction Goals in Transportation Planning and Programming			**Long**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Establish linkages between Air Quality and Health Index findings and transportation planning and programming, especially for bike/ped projects and truck traffic calming projects *(We Will Chicago* Transportation and Infrastructure Objective 4.3)	●	• Institutional Complexities • Monitoring and Performance	◑

[63] https://www.codot.gov/programs/planning/assets/naapme/naapme-resources/naapme-10-year-plan-draft-public-review-1-june-2022.pdf

[64] https://www.codot.gov/programs/planning/assets/naapme/resources/march-30-2023/0-2023-03-30-naapme-board-of-directors-meeting-packet.pdf

Opportunity			Timeframe
7. Emissions Reduction Goals in Transportation Planning and Programming			**Long**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Incorporate the Environmental Justice Index (updated from the Air Quality and Health Index) into transportation infrastructure decision-making	●	• Institutional Complexities • Monitoring and Performance	◕

4.1.3 Incentivizing/Mitigation Opportunities

Incentivizing/Mitigation opportunities require the City to work in conjunction with communities, industry, or other stakeholders to implement the opportunities. Mitigation opportunities seek to reduce the impacts of trucks on residents and communities.

8. Freight Health Metrics

CDPH and CDOT could establish indicators that demonstrate the linkages between freight movement, air pollution, and public health impacts. Using the Air Quality and Health Index as a model, CDPH and CDOT could build metrics that show the overlap of truck traffic volume, particulate matter and diesel particulate matter, and the prevalence of respiratory and circulatory illness at the census block level. These metrics could be organized into neighborhood-level indicators and incorporate them into programs for monitoring and addressing freight impacts on communities. The work on the recently completed CDPH Cumulative Impacts Assessment could be considered as a starting point for developing Freight Health Metrics. As part of the next steps, CDPH and CDOT could identify and agree upon specific metrics to be implemented.

The City currently has multiple planning efforts underway that could also be reviewed for additional objectives and opportunities to incorporate Freight Health Metrics. These include CDPH's Healthy Chicago 2025 Report (released September 2020), CDOT's Strategic Plan (released June 2021), the City's Climate Action Plan (released April 2022), and the citywide framework plan *We Will Chicago* (adopted February, 2023). These plans overlap with the focus of this effort in their attempts to improve environmental justice and public health in historically disadvantaged communities, and all three plans identify metrics relevant to the SWICTS efforts to identify opportunities and solutions.

Data for Freight Health Metrics are controlled by multiple City agencies, and data access and management should be coordinated to ensure decisions are informed by the most recent data sets. Where possible, the multiple metrics should be aggregated into indicators that align with strategic objectives for mitigating freight impacts in communities, including mobility, safety,

public health, and sustainability. The Air Quality and Health Index indicator structure can be used as a model for this data management approach. However, the raw data that constitutes the indicators should still be available for more tailored applications and analyses.

Additionally, these metrics could be used to improve visibility around the actions that the City takes to manage freight impacts. Several metrics could be aggregated to different geographies (neighborhood, community area, aldermanic ward, and/or citywide) and incorporated into a dashboard for stakeholders and the public to monitor these issues on an on-going basis. This dashboard would align with the goals and objectives of the CDPH Air Quality and Health Index, as well as the CDOT Strategic Plan—in particular the goal of using CDOT infrastructure to improve the quality of Chicago's air and water while making Chicago's streets safer and more vibrant.[65]

The dashboard could exist on a dedicated webpage, which appropriate City department(s) would be responsible for building and maintaining. However, maintenance responsibilities for the data that are incorporated into the dashboard would need to be shared between CDOT, CDPH, and other relevant entities to ensure data are accurate and current. The City could promote this dashboard in stakeholder communication activities to raise awareness and use. The City could also establish specific Freight Health Metric trackers for underserved communities to promote greater awareness of the health impacts of freight, create transparency around this issue, and develop performance targets for the transportation network.

As part of strengthening its measurement and monitoring of truck impacts, CDOT could integrate a more comprehensive approach to freight and health into its decision-making processes. This effort could leverage the existing data that CDOT and other city partners already maintain and apply it to inform target-setting for system performance at different geographic levels, as well as for prioritization of solution design and implementation. The updated effort could explicitly measure the relationship between freight movement and public health impacts.

Table 19 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

Table 19. Potential Actions and Considerations for Opportunity 8

Opportunity			Timeframe
8. Freight Health Metrics			Medium-Long
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Identify most critical metrics to measure the impacts of freight on health	◑	• Monitoring and Performance	◔
• Establish a baseline and track metrics at the community level, focusing on underserved or overburdened communities for initial deployment	◑	• Institutional Complexities • Community Engagement • Monitoring and Performance	◑
• Incorporate freight health metrics into annual reporting on transportation system performance (*We Will Chicago* Transportation and Infrastructure Objective 4.3)	◑	• Monitoring and Performance	◑
• Deploy freight health metrics tracking and incorporate into annual reporting to increase the visibility and understanding of impacts (*We Will Chicago* Transportation and Infrastructure Objective 3.2)	◑	• Monitoring and Performance	◑

9. Community Engagement

Across the City, there is value in further improving outreach to both the general public and specific communities. CDOT, in partnership with other City agencies, could increase the opportunities for community engagement and transparency of its efforts to advance its freight-related objectives. The City has at times been the target of negative public sentiment for activities both inside and outside of its control. Furthermore, the outreach conducted by this study found that insufficient or ineffective engagement could lead to the City not getting credit for the positive efforts and outcomes it is achieving in various communities. Intentionally community involvement before, throughout, and after programs and policies increases social equity and empowerment within communities and the City as a whole.

It is important for CDOT and other City departments to identify their own goals in terms of community engagement, then review existing policies and processes to identify gaps and

opportunities for improvement. There are existing guidance and case studies that can be used to inform these processes. NACTO provides guidance to Cities on increasing meaningful public engagement.[66] A city-community partnership was developed in Rancho Cucamonga, California (see Appendix B, Item 7) which could provide a model for processes.[67] The City can also consider resources within its own communities and agencies. Section 2.2 of this report includes a summary of community-sourced recommendations for improving the engagement process.

Table 20 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

Table 20. Potential Actions and Considerations for Opportunity 9

Opportunity			Timeframe
9. Community Engagement			**Short - Long**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Develop planned development engagement standards.	◑	• Institutional Complexities • Equity and Use of City Resources • Community Engagement	◑
• Initiate review of existing engagement practices and research potential enhancements to notices for public meetings.	◑	• Equity and Use of City Resources • Community Engagement	◔
• Provide information throughout the planning process and institutionalizing a process for obtaining community feedback.	◑	• Equity and Use of City Resources • Community Engagement	◑
• Identify a City/Agency community liaison	◕	• Institutional Complexities • Community Engagement	◕

[66] https://nacto.org/wp-content/uploads/2018/09/NACTO_BBSP_2018_Strategies-for-Engaging-Community.pdf

https://nacto.org/event/interim-strategies-and-metrics-to-support-long-term-change/

[67] https://healthyplacesbydesign.org/communities-in-action-rancho-cucamonga-ca/

Opportunity			Timeframe
9. Community Engagement			Short - Long
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Specify a point of contact to explain roles and responsibilities of agency to community and be a point person (*We Will Chicago* Environment Climate and Energy Objective 2.2)	◕	• Institutional Complexities • Community Engagement	◕

10. Cross-Agency Data Sharing

Discussions with City agencies have noted various data that are currently being captured or could be captured in the future. A more comprehensive approach for sharing data related to the community impacts of freight can empower agencies across the City to better incorporate these metrics into their own decision-making, policies, and procedures. As discussed in Chapter 2, a more comprehensive approach leveraging existing data can inform activities such as target-setting for system performance and prioritization of solution design and implementation. Ultimately, this may allow for better measurement and monitoring of the relationship between freight movement and public health impacts.

CDOT and its partners could implement cross-agency data sharing of metrics that are already being captured and are of interest to multiple agencies, including CDPH and CDPD. Some prospective potential metrics are listed in **Table 21** below. Since these data are controlled by multiple City agencies, it would be necessary to coordinate on data access and management to ensure decisions are informed by the most recent data sets. A cross-agency working group could be established to ensure that data are shared in a timely manner. This working group could also identify additional metrics of interest for cross-agency sharing.

Table 21. Prospective Potential Metrics for Cross-Agency Sharing

Objective	Potential Metric	Coordinating Agencies	Representative Data
Mobility	Bike/Ped travel mode share	CDOT	Multimodal traffic counts Divvy ridership data
	Truck traffic volumes	CDOT	Truck AADT
	Truck traffic percentage	CDOT	Multimodal traffic counts

Objective	Potential Metric	Coordinating Agencies	Representative Data
	Traffic volume and proximity	CDOT; CDPH	AADT at major roads within 500 meters, divided by distance in meters
	Average traffic speed	CDOT	HERE traffic reports
Safety	Truck-involved crash rate	CDOT	Crash reports from IDOT, CPD
	Truck-involved crash fatality rate	CDOT	Crash reports from IDOT, CPD
	Bike/Ped crash fatality rate	CDOT	Crash reports from IDOT, CPD
Public Health	Diesel PM concentration / Ozone (summer seasonal average of daily max 8-hour concentration) / $PM_{2.5}$. concentration (annual average)	CDPH	CDPH Air Quality and Health Index data sources
	Est. avg. daytime summer noise	CDPH; CDOT	National Park Service sound map
	Air quality data collection enhancement	CDPH; CDPD	Number of air quality monitors installed; Number of smart sensors installed
Sustainability	Tree canopy coverage	CDOT; CDSS	CRTI[68] canopy coverage map
	Green infrastructure treatments	CDOT; CDSS	Stormwater displacement capability

As part of data access and management planning, the City agencies could designate a central repository for data storage. Where possible, the multiple metrics could be aggregated into indicators that align with strategic objectives for mitigating freight impacts in communities, including mobility, safety, public health, and sustainability. The Air Quality and Health Index indicator structure could be used as a model for this data management approach. However, the raw data that constitutes the indicators should still be available for more tailored applications and analyses.

Additionally, these metrics could be used to improve visibility around the actions that the City takes to manage freight impacts. Several metrics could be aggregated to different geographies (neighborhood, community area, aldermanic ward, and/or citywide) and incorporated into a dashboard for stakeholders and the public to monitor these issues on an on-going basis. This

[68] The CRTI is a nonprofit organization established by in 2014 by the Morton Arboretum. The CRTI manages a comprehensive tree census of the Chicago region and provides a wide array of resources for individuals, private sector entities, and local governments to support urban forestry efforts

dashboard would align with the goals and objectives of the CDPH Air Quality and Health Index, as well as the CDOT Strategic Plan.

The dashboard could exist on a dedicated webpage, which appropriate City department(s) would be responsible for building and maintaining. However, maintenance responsibilities for the data that are incorporated into the dashboard must be shared between CDOT, CDPH, and other entities to ensure data are accurate and current. The City could promote this dashboard in stakeholder communication activities to raise awareness and use.

Table 22 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

Table 22. Potential Actions and Considerations for Opportunity 10

Opportunity			Timeframe
10. Cross-Agency Data Sharing			**Short-Medium**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Identify and implement data-capture of key metrics that are related to or can help inform decisions related to trucks and freight	◕	• Institutional Complexities • Monitoring and Performance	◑
• Develop a cross-agency working group to implement a program to capture and share data among city agencies and/or the public	◑	• Institutional Complexities • Monitoring and Performance	◑
• Create a dashboard for monitoring key metrics at different geographic levels throughout the City	◑	• Institutional Complexities • Monitoring and Performance	◑

4.1.4 Incentivizing/Transformative Opportunities

Finally, Incentivizing/Transformative opportunities seek to remove or change the root causes of the problems, and may have higher levels of effort required as well as potentially greater long-term impacts. These opportunities require coordination between the City and its communities, industries, or other stakeholders to implement.

11. Air Quality Monitoring

The City could build on the commitments to reduce emissions established in the 2022 Climate Action Plan by identifying targets for reductions from the transportation sector. These targets could be used to guide the development of a framework for expanding emissions and air quality monitoring in neighborhoods and for using that localized data to identify projects, programs, and policy reforms to reduce emissions at the local level. Explicit policies and priorities would need to be established for setting, monitoring, and making progress towards those emissions reduction targets within the transportation sector.

As discussed earlier, due to jurisdictional limitations the City cannot use localized emissions data to set more rigorous air quality standards; however, the City could use this information to target clean technology deployments, prioritize traffic reduction and calming measures, and incentivize infrastructure that promotes alternative transportation use by residents and businesses.

The development and deployment of emissions reduction initiatives will require close coordination between CDPH, CDPD, and CDOT, along with other City agencies, in order to target resources towards communities that currently experience a disproportionate burden of freight movement and truck traffic. These agencies will also have to coordinate on the selection of air monitoring technologies that meet the necessary requirements to capture data accurately and reliability at the appropriate geographic scale to allow for informed decision-making.

Table 23 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

Table 23. Potential Actions and Considerations for Opportunity 11

Opportunity			Timeframe
11. Air Quality Monitoring			**Medium**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Use low-cost monitoring to fill in gaps in City's air quality monitoring network	◕	• Equity and Use of City Resources • Monitoring and Performance	◔
• Once developed, align on-site air quality monitoring requirements with Cumulative Impacts Ordinance targets	◕	• Enforcement • Monitoring and Performance	◕

12-. Alternative Freight Fuels and Delivery Models

Recently, transportation agencies have increasingly looked to the last-mile segment of freight deliveries for opportunities to make changes and reduce impacts of trucks. The last-mile includes both local movements as well as deliveries and pickups by truck. Truck deliveries are a significant challenge to curb space and right of way for pedestrians and bicyclists, in addition to their other impacts.

Successful alternatives for last-mile deliveries in Chicago would have multi-layer benefits for both communities and users of the shared corridors. A recent proposal would implement an enforcement pilot program for vehicles – including delivery vehicles – which inappropriately stop or park on City streets.[69] *We Will Chicago* has several goals and objectives that promote the use of alternative delivery vehicles, including proposing an incentive program for vehicle adoption and installation of priority loading / unloading facilities for ZEV/cargo bikes.

The Plan also calls for zoning / permitting incentives for community freight hubs, which are designed to centralize deliveries for smaller parcels in neighborhoods. Rather than relying on trucks to complete a series of “door-to-door” stops, each community freight hub serves as a central location for truck trips, and residents visit the hub to pick up their packages. This model reduces truck traffic and idling in neighborhoods and simplifies route planning for logistics companies, leading to shorter delivery times.

There are numerous studies, pilot programs, and deployments of alternative truck delivery from around the country that can guide development and deployment of a program in Chicago. The Seattle Neighborhood Delivery Hub pilot project[70] is an innovative pilot project in Seattle’s Uptown community which brings together different transportation and delivery logistics companies to reduce congestion and emissions. These microhubs contain parcel lockers, an electric cargo bike fleet, last-mile delivery routing software, electric pallets, and other elements to attain zero-emissions for last-mile deliveries. This pilot project is in collaboration with the Seattle Department of Transportation and is part of the City of Seattle's Transportation Electrification Blueprint, which includes the goal of transitioning 30% of goods delivery to zero emissions by 2030.

A complementary strategy to alternative truck delivery is alternative fuel programs. Chicago has already implemented several programs to reduce truck emissions by replacing diesel trucks with zero- and near-zero emission vehicles, including the Drive Clean Chicago Program, and the *We Will Chicago* objective to mitigate the health, safety, and environmental burdens caused by trains, trucks, and delivery vehicles (*We Will Chicago* Transportation and Infrastructure Objective 3.2). An example of this objective could be to develop a Driving Zero-Emissions Communities (DZEC) program to focus on working with fleet operators to encourage the

[69] https://www.nbcchicago.com/news/local/lightfoot-proposes-bus-cameras-video-surveillance-to-target-motorists-who-block-transit-lanes/3049117/

[70] https://www.seattleneighborhoodhub.com/

adoption of electric trucks for vehicle operations in Chicago, prioritizing the reduction of emissions in neighborhoods with high exposure to air pollution.

In addition to incentivizing and subsidizing the cost of investing in zero- or near-zero emission vehicles, CDOT should work with IDOT and its partners to deploy EV charging infrastructure throughout the city. Specifically, EV charging infrastructure suitable for heavy-duty vehicle use should be installed along truck routes and in areas with concentrations of truck-intensive land uses. Truck-intensive facilities should also be encouraged or incentivized to develop their own charging facilities or other green energy systems.

Table 24 presents actions associated with this opportunity and identifies key considerations for the implementation and impact of this opportunity.

Table 24. Potential Actions and Considerations for Opportunity 12

Opportunity			Timeframe
12. Alternative Freight Fuels and Delivery Methods			**Ongoing**
Potential Actions	**Effectiveness ● High - ◔ Low**	**Tradeoffs to Consider**	**Implementation Difficulty ● High - ◔ Low**
• Design and deploy community freight hubs, Low-/Zero-Emission loading zones, and other strategies	◕	• Land Use and Economic Development Patterns • Community Engagement	◕
• Support and manage Drive Clean Chicago Program	◕	• Equity and Use of City Resources • Community Engagement	◕
• Deploy and manage Driving Zero-Emission Communities Program (EV fleet adoption by corporate partners) *(We Will Chicago* Transportation and Infrastructure Objective 3.2).	◕	• Equity and Use of City Resources • Community Engagement	◕
• Incentivize adoption of EV charging infrastructure and onsite green energy systems at truck-intensive facilities.	◕	• Land Use and Economic Development Patterns • Institutional Complexities	◕

Table 25. Opportunities for Addressing Impacts of Trucks in Local Communities

	Potential Opportunities	Objective	Timeframe	Actions
1	Freight-Impact Reducing Street Design	Implement street design policies that accommodate trucks where necessary in ways that minimize impacts on other road users	• Medium-Long: Overall process is medium- to long-term, but can be initiated quickly	• Conduct a national review of best practices in truck-inclusive and Complete Streets design and update the Chicago Street Design Guidelines to incorporate best practices in minimizing truck impacts on multi-use corridors • Incorporate street design to mitigate truck impacts by minimizing conflict points between trucks and vulnerable road users (*We Will Chicago* Transportation and Infrastructure Objective 3.1) • Where appropriate, increase ped/bike infrastructure, expand tree planting along multi-use corridors (*We Will Chicago* Transportation and Infrastructure Objectives 3.1 and 3.2, Environment Climate and Energy Objective 4.4) • Develop and promote alternative freight routes to reduce through-truck use on key neighborhood corridors • Build upon the SWICTS study to conduct a comprehensive review of key multi-use corridors in disadvantaged communities; identify and implement context-sensitive solutions to reduce the impacts of freight

	Potential Opportunities	Objective	Timeframe	Actions
2	Truck Routing and Restrictions	Discourage unnecessary truck activity in areas that are not well suited for it	• Short: Opportunity focuses on increasing use of existing policies and programs	• Upgrade technology along truck routes to monitor volumes and movements of all modes, inform traffic management operations, and identify locations necessitating improvements (*We Will Chicago* Transportation and Infrastructure Objective 3.1) • Leverage the Chicago Truck Works Advisory System • Work with IDOT to update the City's designated truck route system where appropriate • Work with IDOT and GPS vendors to ensure up to date truck route and restriction data are available on common platforms • Address truck cut-through activities on residential streets or others where trucks are not wanted/ warranted through policies or infrastructure • Adopt a policy to incorporate community-led and equity considerations in truck route identification in and near disadvantaged communities • Identify tactical opportunities for meaningful truck restrictions

	Potential Opportunities	Objective	Timeframe	Actions
3	Illegal Truck Parking and Idling	Improve air quality, safety and congestion by enforcing truck parking and idling restrictions in areas that are not well suited for it	• Short – Medium: Opportunity focuses on increasing use of existing policies with new elements	• Increase fines for parking/idling violations and ensure they are charged to the company/owner, not individual workers • Ensure truck parking facilities are not creating neighborhood harm; facilities should be subject to the considerations of the Air Quality Zoning Ordinance, Cumulative Impact Assessment and Ordinance, and other pertinent regulations for truck-intensive facilities • Update the 311 system to allow for communication with the city for truck parking and idling violations. (see opportunity 5) • Work collaboratively with CPD and/or other enforcement agencies to identify opportunities for streamlining or enhancing enforcement opportunities in sensitive locations • Adopt a Citizens Air Complaint program allowing witnesses to submit evidence of parking or idling violations and collect a portion of the fine levied on the operator or owner (modeled on NYC program)
4	Air Quality Zoning Ordinance (AQZO) and Sustainable Development Policies	Measure and regulate the construction and expansion of facilities that generate truck trips	• Ongoing-Long: AQZO is newly implemented; will be important to track outcomes over time and consider adjustments, if needed	• Develop industrial site design guidelines, including vegetative buffers and green stormwater installation • (*We Will Chicago* Transportation and Infrastructure Objective 3.2, Environment Climate and Energy Objective 4.5) • Periodically review process and outcomes for the AQZO, including the Traffic Study and Air Quality Study to ensure alignment with City goals • Review opportunities for leveraging the CDPD Sustainable Development Policies for mitigation of impacts at truck-generating facilities • Establish on-site air quality monitoring requirement for construction projects as part of permitting process

	Potential Opportunities	Objective	Timeframe	Actions
5	311 System	Enhance the system to allow for truck-related complaints	• Short - Medium: Action can be taken quickly, but will require inter-agency coordination	• Update 311 system to include truck impact specific categories, such as emissions/air quality concerns, heavy congestion, non-emergency safety and security issues such as inadequate infrastructure, etc. • Conduct outreach to educate residents and increase engagement with 311 system in underrepresented communities
6	Cumulative Impacts Assessment	Use environmental metrics and targets/thresholds to limit future impacts and/or reduce overall impacts, particularly in environmentally overburdened and historically underserved communities	• Ongoing-Long: Process to establish assessment is underway by CDPH, deployment and implementation outcomes along with CIO development will be long-term processes	• Implement the Cumulative Impacts Assessment • Identify key environmental metrics and establish a baseline in the City, particularly overburdened or underserved communities (*We Will Chicago* Environment, Climate and Energy Objective 2.4) • Establish targets for positive outcomes in communities that are environmentally overburdened • Implement policies and/or processes to minimize impacts of freight • Identify roles and responsibilities for City agencies for regulation and enforcement • Pass a Cumulative Impacts Ordinance that codifies requirements into the City Municipal Code

	Potential Opportunities	Objective	Timeframe	Actions
7	Emissions Reduction Goals in Transportation Planning and Programming	Use transportation investments, policies, and programs to support emissions reduction and air quality goals	• Long: Development of a city-wide framework for incorporation of emissions reduction into decision making will require high-level buy-in and investment, similar to programs such as the Cumulative Impacts or Air Quality Zoning Ordinances	• Establish linkages between Air Quality and Health Index findings and transportation planning and programming, especially for bike/ped projects and truck traffic calming projects *(We Will Chicago* Transportation and Infrastructure Objective 4.3) • Incorporate the Environmental Justice Index (updated from the Air Quality and Health Index) into transportation infrastructure decision-making
8	Freight Health Metrics	Identify and track metrics of the health impacts of freight	• Medium-Long: Opportunity may be incorporated into deployment of Cumulative Impacts Ordinance, or could be undertaken as a stand-alone process	• Identify most critical metrics to measure the impacts of freight on health • Establish a baseline and track metrics at the community level, focusing on underserved or overburdened communities for initial deployment • Incorporate freight health metrics into annual reporting on transportation system performance (*We Will Chicago* Transportation and Infrastructure Objective 4.3) • Deploy freight health metrics tracking and incorporate into annual reporting to increase the visibility and understanding of impacts (*We Will Chicago* Transportation and Infrastructure Objective 3.2)

	Potential Opportunities	Objective	Timeframe	Actions
9	Community Engagement	Expand resources for information-sharing with community organizations and develop community engagement practices aligned with community needs and preferences	• Short – Long: Some improvements to the engagement process can be incorporated quickly, but long-term outcomes will require culture and policy change at the Agency and/or City level	• Develop planned development engagement standards: Initiate review of existing engagement practices and research potential enhancements to notices for public meetings. • Provide information throughout the planning process and institutionalizing a process for obtaining community feedback • Identify a City/Agency community liaison • Provide information throughout the planning process, and allow for community feedback. • Specify a CDOT point of contact to explain roles and responsibilities of agency to community and be a point person (*We Will Chicago* Environment Climate and Energy Objective 2.2)
10	Cross-Agency Data Sharing	Increase availability and use of data to inform planning and decision making on issues impacting freight and communities	• Short-Medium: Initial data sharing can begin immediately while development of a program and dashboard is underway	• Identify and implement data-capture of key metrics that are related to or can help inform decisions related to trucks and freight • Develop a cross-agency working group to implement a program to capture and share data among city agencies and/or the public • Create a dashboard for monitoring key metrics at different geographic levels throughout the City
11	Air Quality Monitoring	Implement the Partnership for Healthy Cities Air Quality Monitoring Plan implementation strategies	• Medium: Opportunity requires expanded deployment of various technologies and community coordination	• Use low-cost monitoring to fill in gaps in City's air quality monitoring network • Once developed, align on-site air quality monitoring requirements with Cumulative Impacts Ordinance targets

	Potential Opportunities	Objective	Timeframe	Actions
12	Alternative Freight Fuels and Delivery Models	Support and accelerate programs that promote cleaner freight solutions to reduce adverse environmental impacts of freight movement	• Ongoing – Medium: Actions are already underway; it will be important to continue to monitor program effectiveness and modify/advance over time	• Design and deploy community freight hubs, Low-/Zero-Emission loading zones, and other strategies • Revitalize and manage Drive Clean Chicago Program • Deploy and manage Driving Zero-Emission Communities Program (EV fleet adoption by corporate partners) *(We Will Chicago* Transportation and Infrastructure Objective 3.2). • Incentivize adoption of EV charging infrastructure and onsite green energy systems at truck-intensive facilities.

Appendix A. Additional Research on Air Quality Issues

Air pollution is monitored at local, state, and federal levels, but many of the regulations on air pollution are set at the federal level by the United States Environmental Protection Agency (EPA). The EPA is given the authority to establish, review, and revise the National Ambient Air Quality Standards (NAAQS) for each criteria air pollutant by Sections 108 and 109 of the U.S. Clean Air Act (CAA).[71] EPA sets primary standards, which protect public health, and secondary standards, which provide for public welfare (e.g., decreased visibility, damage to animals and vegetation).

Table 26 summarizes EPA's current standards for the NAAQS pollutants.[72] Specific health challenges associated with the NAAQS pollutants and other pollutants present in truck exhaust are presented in **Table 27** at the end of this Appendix.

Table 26. EPA Primary and Secondary Standards for NAAQS Pollutants

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		Primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		Primary and Secondary	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide (NO_2)		Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and Secondary	1 year	53 ppb	Annual Mean
Ozone (O_3)		Primary and Secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter (PM)	$PM_{2.5}$	Primary	1 year	12.0 µg/m^3	Annual mean, averaged over 3 years
		Secondary	1 year	15.0 µg/m^3	Annual mean, averaged over 3 years
		Primary and Secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years

[71] 42 USC Chapter 85: Air Pollution Prevention and Control Section 7408: Air quality criteria and control techniques. 42 USC Chapter 85: Air Pollution Prevention and Control Section 7409: National primary and secondary ambient air quality standards.

[72] Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air (µg/m^3).

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
Sulfur Dioxide (SO_2)	Primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

The EPA produces requirements and guidance for monitoring and reporting on NAAQS emissions levels via the Code of Federal Regulations (CFR) Title 40, which are then implemented by tribal, state, and local governments. State governments must develop monitoring plans based on CFR standards, as much of the EPA's enforcement of NAAQS standards relies on state and tribal government planning and action. The EPA reviews and approves each monitoring plan on a five-year cycle (Illinois' monitoring plan was most recently reviewed and approved by the EPA in 2019).

Within one year of setting a new or revising a NAAQS for a criteria pollutant, states and tribes submit recommendations based on available air quality data and modeling to the EPA as to whether or not an area is meeting the standard. The EPA then reviews this information and designates an area as an **attainment area** or a **non-attainment area** for a criteria pollutant, based on whether or not they meet the standard for the pollutant. A non-attainment area can be classified as marginal, moderate, serious, severe, or extreme, based on the volume of pollutants present.

State and local governments with non-attainment areas must develop State Implementation Plans (SIP) or Transportation Improvement Programs (TIP) to outline their plans to meet and maintain air quality standards. These plans must indicate that new transportation projects do not contribute to non-attainment for criteria pollutants or improve existing pollutant levels. Once the EPA approves all or parts of an SIP, those measures are enforceable in federal court. Failure to submit an SIP or to address inadequacies identified by the EPA in a submitted SIP may result in sanctions on federal funding for highway projects (except for those that relate to safety).[73]

EPA regulations also include a "Good Neighbor" requirement under the CAA. The "Good Neighbor" regulations account for the fact that air quality within a state, known as a "downwind state", can be affected by emissions produced in a neighboring state, known as an "upwind state," that are then carried to the downwind state by wind currents. The upwind state must account for its contributions to the downwind state's air quality in its SIP. Illinois is one of 26 states covered by this rule. The Good Neighbor rule was part of a Cross-State Air Pollution Rule and has been strengthened under a more recent initiative, the Good Neighbor Plan.

In May 2023, the EPA's Good Neighbor Plan will go into effect, using more stringent emissions limits for NO_x and SO_2 for coal- and gas-fired power plants for states covered by the Good Neighbor requirement. Additionally, the Good Neighbor Plan will establish NOx emission standards for industrial uses in 23 of the 26 states (including Illinois) for the first time. These industrial uses

[73] 42 US Code Ch. 85 Subchapter I Part D §7509: Sanctions and consequences of failure to attain.

include cement product manufacturing, iron and steel mills, natural gas transportation pipelines, and chemical manufacturing. Power plans and industrial facilities will have to adopt emissions controls that bring emissions below budgeted levels set by the EPA; these budgets are initially based on existing emissions control technologies, but will be lowered through 2029 to align with emissions reductions achievable through the installation of new, commercially-available control mechanisms.[74]

Like most states (except California), Illinois' ability to regulate air pollution is established by the standards of the CAA. The Illinois Environmental Protection Agency (IEPA) is responsible for monitoring air pollution volumes and evaluating attainment with the permitted NAAQS volumes. For the past three years, Illinois has been in attainment with emission maximums for all NAAQS pollutants except for ozone and, in one circumstance in Madison County, sulfur dioxide. Cook County is currently designated as nonattainment for ozone releases over an 8-hour period. This status may change if the EPA formally adopts a proposed rule that would adjust the NAAQS standard for PM2.5 from its current threshold value of 12 $\mu g/m^3$ to 9 to 10 $\mu g/m^3$.[75] The three-year annual design value for Pm2.5 over Chicago is about 9.5 $\mu g/m^3$.

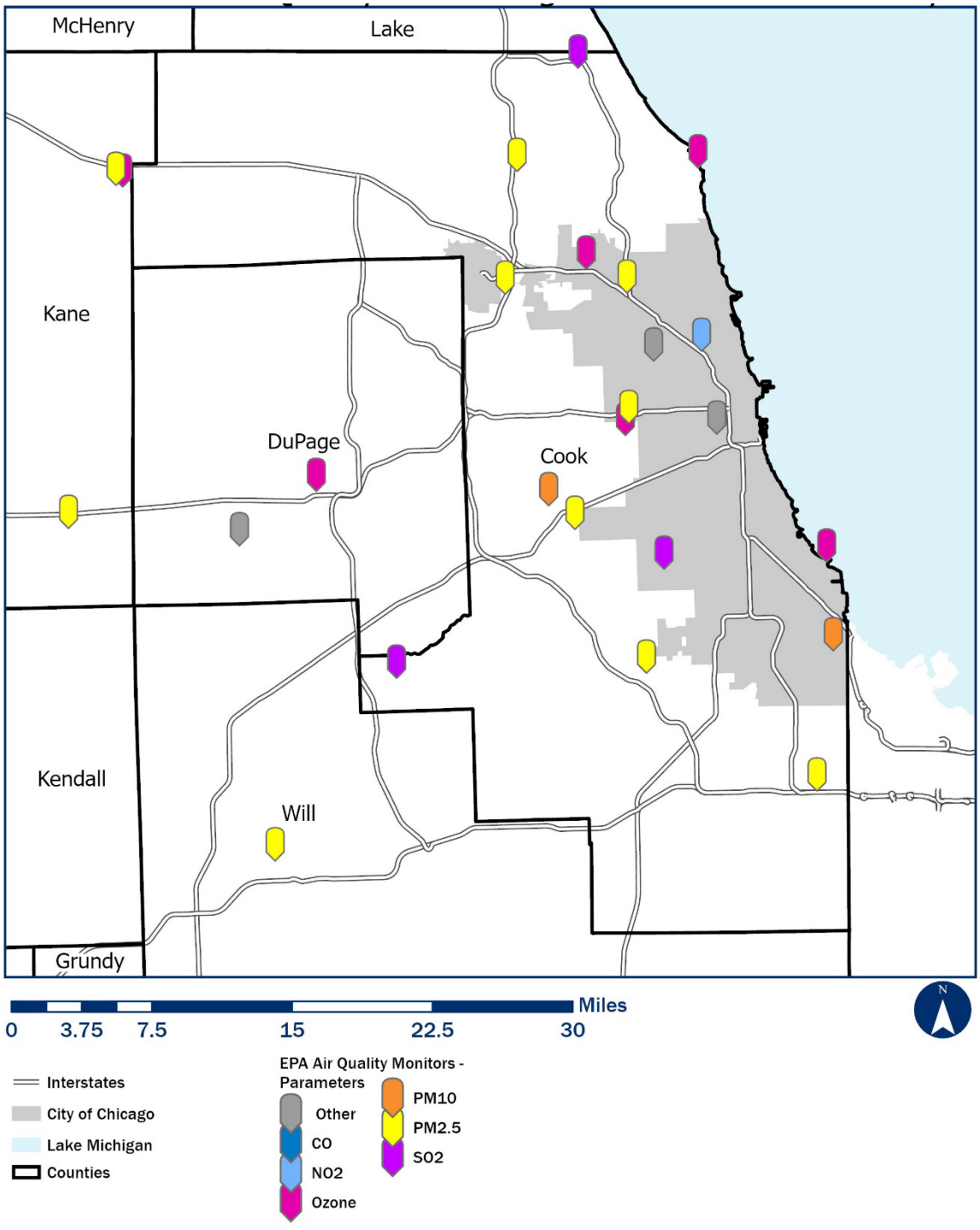
IEPA monitors air quality conditions with a network of 64 monitoring sites across the state. Of these 64 sites, eight are located in Chicago and 11 are located in Cook County outside the city.[76] These mapping locations are presented in **Figure 18** below:

[74] "EPA's Proposed 'Good Neighbor' Plan to Address Ozone Pollution – Overview.' *US EPA.* March 2022. < fact-sheet_2015-ozone-proposed-good-neighbor-rule.pdf (epa.gov)>

[75] US EPA. "EPA Proposes to Strengthen Air Quality Standards to Protect the Public from Harmful Effects of Soot | US EPA." 6 January 2023. < https://www.epa.gov/newsreleases/epa-proposes-strengthen-air-quality-standards-protect-public-harmful-effects-soot#:~:text=EPA's%20proposal%20will%20specifically%20take,taking%20comment%20on%20the%20full>

[76] Illinois Environmental Protection Agency. Illinois Air Quality Report 2019. 2019. https://www2.illinois.gov/epa/topics/air-quality/air-quality-reports/Documents/2019AnnualAirQualityReportFinal.pdf.

Figure 18. Location of Air Quality Monitors in Cook County



Under state and federal guidelines, monitoring sites must be installed to measure expected maximum concentrations and to measure concentrations in areas where poor air quality is combined with high population exposure. While IEPA must adhere to these guidelines, the Agency has some discretion on the location of the monitors, and uses a 30-day public comment period

during the development of the annual Air Monitoring Plan to obtain input on potential installation sites. IEPA provides information on air quality via the AQI. The Air Monitoring Plan is published in November, and its open comment period takes place in July.

The IEPA monitoring network uses a combination of continuous and non-continuous air monitoring sensors for all NAAQS pollutants. Continuous instruments collect data throughout the year, while non-continuous instruments collect samples on three-day and six-day cycles. Air quality data from non-continuous monitors must meet a percentage of schedule coverage based on the relevant measurement for each NAAQS pollutant.[77]

Within Chicago, the Chicago Department of Public Health (CDPH) is responsible for the monitoring and regulation of issues that positively and negatively affect the health of residents and communities within Chicago. Air quality management falls under CDPH's jurisdiction, and CDPH is authorized under the Chicago Municipal Code 11-4 to establish regulations that minimize air pollution. In addition to its permitting and enforcement activities, CDPH conducts ongoing monitoring of the City's air quality for evaluation and policymaking.

CDPH regulates air pollution in the City through the use of Air Pollution Control (APC) permits. CDPH's guidance on APC permits indicate that regulated equipment and processes consist of those used in fixed sources rather than mobile sources (i.e., vehicles).[78] Any entity that holds an Air Pollution Control permit must comply with the air pollution control ordinance and any applicable regulations. Permit holders must also obtain a Certificate of Operation, which they must renew on an annual basis and certify that they continue to meet the standards set forth in Section 11-4-670 of the Chicago Municipal Code.

The Chicago Municipal Code authorizes CDPH to conduct inspections of regulated equipment or areas. If a violation is determined to have occurred, CDPH may issue an emergency or non-emergency order of cessation or abatement that requires the polluter to stop the polluting activity until CDPH has determined that the risk to public health, safety, or the environment has ended. Additionally, CDPH may levy penalties against the violator.

[77] Illinois EPA. 2019.

[78] Chicago Department of Public Health. "A Guide to Obtaining Air Pollution Control Permits." January 2014. https://www.chicago.gov/content/dam/city/depts/cdph/environmental_health_and_food/FAQsAPCPermits_RevJan2014.pdf.

Table 27. Truck Exhaust Pollutants, Health Risks, and Thresholds[79]

Pollutant	Description	Health Risks	Exposure Thresholds
Fine Particulate Matter less than 2.5 microns ($PM_{2.5}$), including Diesel—$PM_{2.5}$, Elemental Carbon ($EC_{2.5}$), and Organic Compounds ($OC_{2.5}$)	Fine particulate matter is generated during combustion and is present in vehicle exhaust. It is also generated from tires and road debris from moving vehicles and from regional atmospheric chemical reactions (of which truck exhaust (NO_X) is a contributor). $PM_{2.5}$ is estimated to be responsible for about 95 percent of air pollution's global public health impacts.	➢ Premature death in people with heart or lung disease ➢ Nonfatal heart attacks ➢ Irregular heartbeat ➢ Aggravated asthma ➢ Increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing	The USEPA National Ambient Air Quality Standards (NAAQS) identifies primary and secondary standards for $PM_{2.5}$ (annual average standards with levels of 12.0 micrograms per cubic meter (µg/m3) and 15.0 µg/m3, respectively; 24-hour standards with 98th percentile forms and levels of 35 µg/m3) (US Environmental Protection Agency 2020)
Carbon Monoxide (CO)	CO is a gas that is generated when fuel is incompletely burned in an engine and is a serious health risk at high concentrations, particularly in enclosed spaces. Idling traffic in queues at intersections can result in carbon monoxide concentrations exceeding 50 ppm.	➢ Irritation of the lower respiratory system ➢ Lightheadedness, headaches, fatigue, confusion	OSHA 8-hour exposure limit: 35 parts per million (ppm) (https://www.cdc.gov/niosh/npg/npgd0105.html)

[79] Agency for Toxic Substances and Disease Registry, "Toxic Substances Portal - Public Health Statements," [Online]. Available: https://wwwn.cdc.gov/TSP/PHS/PHSLanding.aspx?id=1146&tid=253. [Accessed February 2021].; P. Fine, C. Sioutas and P. Solomon, "Secondary particulate matter in the United States: Insights from the Particulate Matter Supersites Program and related studies," *Journal of the Air & Waste Management Association,* Vol. 58, no. 2, p. 234–253, 2008; P. Orellano, N. Quaranta, J. Reynoso, B. Balbi, and J. Vasquez, "Effect of outdoor air pollution on asthma exacerbations in children and adults: Systematic review and multilevel meta-analysis.," *PLOS ONE,* Vol. 12, No. 3, p. e0174050, 2017; C. I. Pope and D. Dockery, "Health effects of fine particulate air pollution: Lines that connect.," *Journal of the Air & Waste Management Association,* Vol. 56, No. 6, p. 709–742, 2006.

Pollutant	Description	Health Risks	Exposure Thresholds
Nitrogen Oxides (NO_X)	NO_X gases are produced from the reaction among nitrogen and oxygen during the combustion of fuels	➢ Respiratory problems ➢ Asthma trigger	National Institute for Occupational Safety and Health (NIOSH) 1 hour exposure limit: 10 ppm (https://www.cdc.gov/niosh/idlh/10102440.html)
Sulfur Dioxide (SO_2)	Sulfur dioxide found in the air results primarily from activities associated with the burning of fossil fuels.	➢ Eye irritant ➢ Lower and upper respiratory irritant	8-hour exposure limit: 5 ppm, exercising asthmatics can experience effects at levels as low as .25 ppm (Centers for Disease Control 1998) (https://www.cdc.gov/niosh/npg/npgd0575.html)
Benzene	Benzene is present in gasoline at much higher concentrations than in diesel fuel and is produced during the combustion of both fuels.	➢ Irritation of the upper respiratory system ➢ Irritation of the eyes ➢ Associated with the development of Leukemia	8-hour exposure limit: 1 ppm (https://www.cdc.gov/niosh/npg/npgd0049.html)
Aldehydes (Formaldehyde, Acrolein, Acetaldehyde)	Aldehydes are produced during the burning of fuel. Diesel engines and ethanol based fuels produce significantly higher amounts of aldehydes than do gasoline engines	➢ Irritation of the upper respiratory system ➢ Headaches ➢ Dermatitis (skin irritation)	8-hour exposure limit: Formaldehyde: .75 ppm, Acrolein: .1 ppm, Acetaldehyde: 200 ppm (https://www.cdc.gov/niosh/npg/npgd0001.html)
1,3-Butadiene	1,3-Butadiene is a chemical made from the processing of petroleum but can occur from automobile exhaust	➢ Affects the central nervous system ➢ Irritant for the upper respiratory system ➢ Probable carcinogenic	8-hour exposure limit: 1 ppm (https://www.cdc.gov/niosh/npg/npgd0067.html)

Limitations and Challenges with Air Quality Monitoring Regulations

Low-cost air quality monitoring sensors can be used to augment federal monitoring networks and build more nuanced air quality profiles. In Chicago, both for-profit and non-profit organizations have been working with the City to “fill in the gaps” in the air quality monitoring network. While these organizations and the sensors they are implementing lack the authority to enforce regulations, these low-cost air quality monitoring sensors are being deployed to help conduct research on localized air quality levels within Chicago. Many of these organizations are collecting this

information to improve the availability of air quality data for themselves and their community partners in order to build local understanding and strengthen advocacy efforts.

In some cases, these organizations are coordinating directly with City agencies to share this information and advocate for new policy. As referenced in Section 2.3.2, Microsoft coordinated with the Environmental Law and Policy Center, Array of Things, JCDecaux, and the City of Chicago to install over 100 low-cost real-time air quality sensors on bus shelters throughout the city in July 2021.[80] Microsoft Research installed the sensors according to risk factors of population and traffic, but also worked with several environmental justice organizations to select additional sites based on community priorities. Sensors were located in every community area of the city and monitored PM2.5 levels within a 300-meter radius every five minutes, producing a very detailed and localized understanding of air quality conditions and pollutant levels. The data were made publicly available on a Microsoft-hosted website, and the findings were used to inform advocacy and analysis efforts on air quality issues in Chicago neighborhoods.

In other cases, these efforts are demonstrating the effectiveness and utility of various technologies for subsequent partnerships in air quality monitoring and urban computing efforts.[81] CDPH is working with some members of the Chicago Environmental Justice Network, the Center for Neighborhood Technology, and the University of Illinois at Chicago's School of Public Health on a planning grant funded by the Partnership for Healthy Cities. This plan will develop a systematic approach for expanding the availability of air quality data for "co-developing a sustainable, City-run, data-informed, and community-driven air monitoring network."[82] The plan identified strategies for establishing additional air monitoring sensors within communities and integrating expanded air quality data into communication and decision-making processes.

Federal regulations create limitations for private sector efforts as well. Low-cost air sensors, like those currently being used by these organizations, are not approved by the EPA for regulatory purposes. As a result, local and state agencies cannot use the data or findings of these monitoring networks to make regulatory decisions or to enforce air quality standards. This barrier to regulatory use restricts more detailed data analysis that might otherwise be enabled by the deployment of low-cost sensors.

For example, PurpleAir, a private company, makes low-cost real-time air quality monitoring sensors that monitor PM2.5, ozone, and Volatile Organic Compounds (VOCs), as well as meteorological conditions like pressure, temperature, and humidity. PurpleAir sensors use laser particle counters to count the number of airborne particles in the air based on an average particle density,[83] which may overreport concentrations of PM2.5. Federal regulations more commonly measure mass

[80] Microsoft. "Urban Innovation Research." https://www.microsoft.com/en-us/research/urban-innovation-research/

[81] Daepp, Madeline I.G., Alex Cabral, et al. "The 'Three-Legged Stool': Designing for Equitable City, Community, and Research Partnerships in Urban Environmental Sensing." *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems.* April 2023. https://dl.acm.org/doi/pdf/10.1145/3544548.3581289.

[82] Correspondence with Chicago Department of Public Health. 11 January 2023.

[83] PurpleAir FAQs. <https://www2.purpleair.com/community/faq#hc-what-do-purpleair-sensors-measure-1>

concentration by weighing the particulate matter that collects on a filter. As a result, the PurpleAir sensors by design are less accurate than EPA-approved methods and cannot be used for regulatory decision-making.

Researchers at the Massachusetts Institute of Technology recently produced an open-source, low-cost mobile pollution detector called Flatburn, which can be made by 3D printing or assembling modular parts.[84] Recent tests of Flatburn in New York City and the Boston area compared their performance to existing pollution detection systems. The test found that while the Flatburn tools were not as precise as existing systems, they demonstrated a strong enough correlation to produce reliable results for analysis.

Both the PurpleAir and Flatburn monitoring systems are designed to make data readily accessible. PurpleAir maintains a crowdsourced map of all active public monitors. The map presents real-time air quality data for a wide variety of metrics at multiple measurements, and is publicly available on the PurpleAir website at map.purpleair.com. Current and historic data may be downloaded from the website. Similarly, Flatburn's release is being paired with technical assistance documentation for setting up monitoring, reviewing and interpreting results, and finding applications for the data. While the systems are not as accurate as regulatory-grade systems, their ability to make more data available at lower costs could rapidly improve public agencies' capacities to build more granular databases and deploy more targeted solutions.

[84] Dizikes, Peter. "Low-cost device can measure air pollution anywhere." *MIT News*. 16 March 2023.

Appendix B. Stakeholder Engagement Summary

As part of the SWICTS project, the project team conducted a robust stakeholder engagement effort with community groups located in Study Area neighborhoods in late 2021 and early 2022. The purpose of this engagement effort was to hear directly from community members who experience the adverse impacts of truck traffic and understand what their priority issues are, what they want to see change within their communities, which solutions they would prefer to see, and how they want to be engaged in future planning efforts.

The project team determined that, prior to exploring solutions, an important first step was to gather feedback from community stakeholders through structured listening sessions. These listening sessions aimed to understand challenges, identify opportunities to address issues that may have been considered or explored, and gather insights that could inform questions in the study. Additionally, the listening sessions provided a platform to provide background information on the study and share what the project team had learned from previous community discussions while also engaging in a conversation about community impacts, concerns, and priorities.

Methodology

Community stakeholders were identified by the Chicago Department of Transportation (CDOT), the Chicago Department of Planning and Development (CDPD), Cambridge Systematics (as the prime consultant to CDOT), and Purple Group (as a supporting consultant on the Cambridge Systematics team). Additional input was provided by Transportation Equity Network (TEN) and the local aldermen within the study area. Within that list, key stakeholders were identified by CDOT, DPD, TEN, and the aldermen to be engaged to participate in the listening sessions.

Once key community stakeholders were identified, the organizations were grouped by geography, with the exception of third-party organizations/task forces.

- Group A consisted of third-party organizations;
- Group B consisted of organizations within the Little Village and nearby areas;
- Group C consisted of organizations within Lawndale and nearby areas;
- Groups D and E consisted of organizations within Bridgeport, Pilsen, McKinely Park, and nearby areas (note Group D became too large for a listening session and was split into Groups D1 and D2);
- Group F consisted of organizations within Archer Heights, Back of the Yards, Gage Park, Garfield Ridge and Midway; and
- Group G consisted of organizations from the River Ecology and Governance Task Force.

Community stakeholders were engaged to participate in the listening sessions via email and phone correspondence. The project team managed the correspondence, tracked stakeholder interest to participate, and coordinated the listening sessions. Note that Group G was coordinated by Jamie Osborne, DPD, since he was a member of the River Ecology and Governance Task Force.

Given the Covid-19 pandemic, the listening sessions were conducted virtually via Zoom. The project team managed and moderated the virtual listening sessions, in which a background of the project was provided by the project team, priorities were ranked by the stakeholders via an integrated live-ranking application (Poll Everywhere), and then a discussion followed based on the identified priorities. Each listening session lasted two hours and concluded with the project team sharing high-level next steps and answering questions that stakeholders had regarding the study.

Each Listening Session was facilitated based on the following outline:

- Introduction
- Context (presentation by CDOT, DPD staff)
  - Historical Overview
  - Why now?
  - Study Overview
  - Overview of Known Community Concerns
- Priority Rankings via Poll Everywhere
- Discussion
- Conclusion
  - Next Steps
  - Contact Information
  - Opportunity for Questions

After each session, the presentation deck, an interactive map, and contact information was shared with each of the participants.

A total of six (7) listening sessions were conducted with a total of 52 participants representing 36 organizations. These organizations are presented in **Table 28**.

After each session, the presentation deck, an interactive map, and contact information was shared with each of the participants.

Table 28. SWICTS Listening Sessions and Participating Organizations

Listening Session	Date	Participating Organizations
Session 1 (Group B)	September 15, 2021	• Little Village Environmental Justice Organization • The Southwest Collective • Neighbors for Environmental Justice
Session 2 (Group A)	September 16, 2021	• Active Transportation Alliance • Metropolitan Planning Council • Respiratory Health Association • UIC Urban Planning & Policy Department • Openlands
Session 3 (Group C)	September 28, 2021	• Lawndale Business Renaissance Association • North Lawndale Community Coordinating Council • Equiticity
Session 4 (Group D1)	October 8, 2021	• Bridgeport Alliance • Coalition for a Better Chinese American Community
Session 5 (Group F)	October 26, 2021	• Garfield Ridge Neighborhood Watch Group • Garfield Ridge Chamber of Commerce • Back of the Yards Neighborhood Council
Session 6 (Group G)	November 29, 2021	• Ross Barney Architects • University of Illinois at Chicago, Great Cities Institute • Illinois Environmental Council • Friends of the Chicago River • Northwestern University • Metropolitan Planning Committee • Waste Management • Alliance for the Great Lakes • Commissioners Office for the Metropolitan Water Reclamation District • Shedd Aquarium

Listening Session	Date	Participating Organizations
		• National Wildlife Federation • Calumet Collaborative • Urban Rivers • Chicago Audubon Society • Northeastern Illinois University • Little Village Environmental Justice Organization • El Paseo Community Garden
Session 7 (Groups D2 and E)	February 9, 2022	• Southwest Environmental Alliance (note, this individual dropped off the listening session as soon as the ranking began) • McKinley Park Development Council • Pilsen Neighbors Community Council

Findings

While the groups' participants were asked to rank top community concerns and truck traffic priorities, it is recognized that the study area is very large, including many communities with varying needs.

The following are the findings from the initial set of listening sessions.

Large study area that covers many communities with distinct needs:

The initial listening sessions seem to point to a common set of community and truck traffic concerns. Six out of the seven groups ranked the following within the top three of their priorities.

Community Concerns

- Air quality
- Land use
- Better community engagement with decision markers

Truck Traffic Concerns

- Pollution and emissions from trucks
- Truck traffic near sensitive locations

- Traffic safety for people on roads with high truck volumes

Important variations to the priorities are also visible. These variations may speak to community composition and location:

Community Concerns

- Group F (Back of the Yards, Gage Park, Garfield and Midway (no one from Midway participated Midway)) has strong concerns about congestion, access, and safety issues caused by truck traffic. This group, along with Group C (Lawndale area), ranked good jobs and ensuring economic development as #2 and #1, respectively. All other groups ranked 'good jobs' as least important.

- Group D1 (Bridgeport and some parts of Pilsen) ranked better community engagement with decision makers as number one and congestion, access, and safety issues caused by truck traffic as # 2.

- Group D2+E (Pilsen and McKinley Park) and Group A (Third party organizations) ranked better governance/accountability as #2 and #3, respectively.

Truck Traffic Concerns:

- Group F uniquely ranked pollution and emissions from trucks as the least important item, while all other groups ranked this in the top three. Group F also ranked conflicts between trucks and other vehicles on residential streets in the top three, while all other groups ranked this as less important. Additionally, Group F ranked truck traffic near sensitive locations as less important, compared to all other groups who ranked this in the top three. Lastly, Group F ranked damage from trucks to property, roadway, and curbs as a top three priority (#3)

- Group A, uniquely ranked conflicts caused by stopped trucks (parking, curbside deliveries) in the top three, while all other groups ranked it as less important. Additionally, congestion caused by large numbers of trucks on major streets was ranked as less important.

A different framework is needed – The study should consider real alternative visions, not just mitigations. While mitigating the impacts of freight-related land uses is better than nothing, the City should look at this differently and question the land uses/citing patterns.

Cumulative impact – Across all the groups, participants shared that it was important to understand and take into consideration the cumulative impact of truck traffic and pollutants on an already overburdened community. It was felt that measurements are done for a specific manufacturer/industry, yet the cumulative effect of the impact is not taken into account.

Community is overburdened – There is a need to go beyond mitigation to innovative solutions to decrease the environmental burden on these communities. There is a need to remediate and heal the damage done. Environmental racism should be recognized.

Community versus industry – It's time to prioritize the community.

Monitoring of pollution – There is a need for air quality and overall pollution monitoring, given the negative health effects, high concentration of industries, and the current framework of measuring by individual business versus the cumulative effect of pollution by all businesses in a concentrated, condensed area.

Misdirection – The opportunities in the business corridors are framed from the perspective of jobs, economic benefits, and industry, while the costs are not fully considered.

- Talking points are used to get approval for community jobs, but what does that really look like? Are these living wage/minimum wage jobs? How many jobs are from people from the impacted community? Thorough information is not shared.
- Economic development is used as a tool to steer the conversation.
- What exactly are people in the affected communities getting? What are the workers' protections?
- Better balance between economic development and the climate. A new economy should be developed, and the community should not carry the overwhelming burden of environmental impacts – "don't harm the community." Recognize skills of community beyond strength/force/muscle.

Data/information – Data and information should be shared openly – the who's who and what's what. There should be more access to information (which businesses the City is talking to, which companies are looking for permits, which companies are going into already overburdened communities).

Lack of transparency – It is difficult for community stakeholders to get the information needed to know what is happening or planned in the community.

New policies and enforcement are needed – There are not enough resources to enforce existing policies. Industries are self-certifying, but no one is monitoring or enforcing. Existing policies have to be enforced, and new, different policies are needed.

Value community input – Intentionally plan for timely and authentic input. Go where people are at, have real conversations, and allow people to share their stories. Place a greater weight on the community voice and make meetings and information accessible.

- In-language meetings
- Multiple meetings in the community, during different times
- Attend meetings of community organizations to provide information

- Gather input in various ways, i.e., listening sessions, surveys, attending existing community meetings, etc.

Industry perspective – The study area has some key strengths: ideal location, building stock, and industrial corridors. There are challenges to overcome for economic growth: existing infrastructure needs to improve given the more significant amount of truck traffic, issues with viaducts, streets, and upcoming increase in truck traffic due to the forthcoming project on Roosevelt/Kostner.

Truck Traffic - Specific areas are experiencing high truck congestion, and truck drivers are going through residential streets. It is believed that this is due to the deterioration of infrastructure: viaducts, roads, etc.

Appendix C. Environmental Equity Working Group SWICTS Strategy Discussion Sessions: Matrix and Analysis

Purpose and Context

This document was produced as part of the Southwest Industrial Corridor Transportation study (SWICTS). CNT convened two meetings with members of the Environmental Equity Working Group to collect and organize ideas for strategies that should be considered within the SWICTS project. This document is the result of those meetings, as well as follow-up research by CNT and members of that group.

The identification and discussion of these recommended strategies have been incorporated as inputs into the final set of recommendations produced in the body of this report.

Recommendations: Strategy Matrix

***Asterisks denote strategies that may require State action. In some cases, whether or not the City currently has legal authority to take these actions is contested. This paper does not offer a legal opinion on this question.*

Category	Regulatory/Policy Actions	Investments/ Incentives	Enforcement (w/o Policing)
1. **Truck engine standards, including electrification**	• Electrify drayage vehicles** • Manage engine standards** • Form a NO_X Omnibus rule**	• Re-invest in a truck electrification investment program	
2. **Truck activity and operational standards (non-engine)**	• Provide offsite parking	• Find truck alternatives for last-mile deliveries (i.e., cargo bikes)	• Use a bounty-system for enforcing truck violations (e.g., anti-idling) • Enforce truck restrictions (i.e., on-street truck routes and prohibitions) • Require GPS trackers on fleets
3. **Siting standards and regulations for truck-intensive facilities**	• Order a Cumulative Impacts Ordinance • Authorize a moratorium (warehouses and other freight-related industries)		

Category	Regulatory/Policy Actions	Investments/ Incentives	Enforcement (w/o Policing)
	• Rethink industrial corridor planning		
4. **Capacity, design, and performance standards for truck-intensive facilities**	• Apply Sustainable Development policy actions • Require buffers around sensitive areas, including vegetative buffers and green stormwater installation • Create building size limitations • Regulate and track entrance and exit siting • Support indirect source rule** • Require electric onsite equipment** • Require installation of onsite energy systems such as solar panels • Requirements on facility occupancy and use	• Fast permitting for electric-only warehouses • Fund installation of onsite energy systems and other sustainability features	• Consistently penalize companies for permit violations, including deviations from traffic studies
5. **Charging infrastructure**	• Require installation of vehicle chargers within new developments (on-site and off-site)	• Fund installation of vehicle chargers (on-site and off-site) • Use IIJA funds for heavy-duty vehicles	
6. **Road, bridge, and similar off-site infrastructure**	• Apply road pricing for trucks	• Improve bike and pedestrian infrastructure • Restore tree canopies and green infrastructure in right of way	
7. **Data collection and goal setting**	• Require installation of air quality monitors • Create targets for improving air	• Fund and improve air quality monitoring & data collection	

Category	Regulatory/Policy Actions	Investments/ Incentives	Enforcement (w/o Policing)
	quality and health outcomes		
8. **Others**	• Authorize a regionwide freight authority** • Require Community Benefit Agreements • Require full electrification (beyond trucks) • Improve warehouse worker labor standards • Require installation of increased air filtration systems	• Have authentic and adequately funded community outreach • Fund installation of increased air filtration systems • Prioritize contracting with companies that commit to electrification	• Create a compliance authority • Enable resident reporting to compliance authority

Notes:

1. CNT's discussion group also identified strategies that are commonly discussed but are not recommended. These include the use of biofuels and other alternative fuels that are earlier in the development process, as well as off-hour delivery programs. The group concluded that these strategies may do as much harm as good and would also distract from more immediate priorities.

2. Enforcement is highly recommended to take place without policing because of the violent history city policing has in disproportionately targeting and harming BIPOC individuals and communities; the same communities that experience the brunt of environmental injustices like freight-related air quality hazards.

Recommendations: Strategy Annotations

***Asterisks denote strategies that may require State action. In some cases, whether or not the City currently has legal authority to take these actions is contested. This paper does not offer a legal opinion on this question.*

Category 1: Truck engine standards, including electrification

Regulatory/Policy Actions

Electrify drayage vehicles**

- Trucks currently used only for short routes between intermodals, or drayage, are typically outdated models emitting considerable amounts of pollution. However, technology is quickly

improving to electrify drayage vehicles sooner than other truck classes, so focusing on these first would have major benefits in the areas where intermodal facilities are concentrated.

- To support drayage electrification, plan for local charging hub accommodations on short routes to support the electrification of medium and heavy-duty industry vehicles within city boundaries for optimized drayage and air quality.
- Research the portion of truck traffic that consists of drayage vehicles to allow the effectiveness of this strategy to be estimated.
- Case studies:

  CARB's Zero Emission Drayage Trucks at Seaports and Railyards

  - The California Air Resource Board (CARB) aims to require zero-emission drayage trucks within the state's intermodal seaports and railyards. This is part of their Advanced Clean Fleets regulation to achieve electrification for truck and bus fleets everywhere feasible by 2045, acknowledging drayage vehicles can achieve electrification significantly earlier than this timeframe.

Manage engine standards**

- The Diesel Technology Forum[85] makes recommendations for engine standards that could be implemented prior to full electrification:
  - One recommended policy is that prior to electrification, engines are required to be 2012 models and onward. Engine models 2011 and older would not be allowed for use within city boundaries under this policy.
  - If older vehicle models cannot be replaced with vehicle models made within the past two decades, diesel particulate filters or catalytic converters are used to retrofit older trucks to filter their exhaust. This is only an interim harm reduction effort while electrification efforts take place.
  - Another strategy is to require automatic engine shutoff to prevent diesel powered vehicles from idling.
- *Source: Diesel Technology Forum*

Form a Heavy-Duty Low-NO_X Omnibus rule**

- Inspired by the California Air Resources Board (CARB), nitrogen oxide (NO_X) Omnibus regulation would reduce NO_X limits for model years 2021 and onward. This state-level

[85] The Diesel Technology Forum is a Washington, DC based 501(c)(3) non-profit and leading voice focused on advanced diesel technology and its role within the climate change crisis.

regulation includes updating testing, compliance, and overall standards for NO_X and particulate matter (PM) emissions for warehouse trucks.

Investments/Incentives

Re-invest in a truck electrification investment program

- Re-invest and fundraise for the Drive Clean Chicago program to incentivize private truck fleets in purchasing electric vehicles, with aggressive targets for investment in highly impacted communities. Apply similar targets to other relevant sources like ComEd's Beneficial Electrification program.

Category 2: Truck activity and operational standards (non-engine)

Regulatory/Policy Actions

Provide offsite parking

- Prevent heavy-duty industrial vehicles from parking and idling on residential streets by providing offsite parking near warehouses in areas that do not conflict with residential uses. This also includes providing offsite parking in locations that avoid conflicts with vulnerable populations at schools, daycares, health centers, parks, etc. The public versus private responsibilities for funding and maintaining offsite parking are still to be determined.

Investments/Incentives

Find truck alternatives for last-mile deliveries

- Find trucking alternatives for last-mile deliveries between the warehouse distribution center and the consumer. This includes using cargo bikes rather than vans, customer-pick up at collection points, and electric vans.
- Case study:

  The Seattle Neighborhood Delivery Hub pilot project.

  - An innovative pilot project in Seattle's Uptown community brings together different transportation and delivery logistics companies to reduce congestion and emissions. These microhubs contain parcel lockers, an electric cargo bike fleet, last-mile delivery routing software, electric pallets, and other elements to attain zero-emissions for last-mile deliveries. This pilot project is in collaboration with the Seattle Department of Transportation and is part of the City of Seattle's Transportation Electrification Blueprint which includes the goal of transitioning 30% of goods delivery to zero emissions by 2030.

Enforcement (Without Policing)

Use a bounty-system for enforcing truck violations

- Use a Citizens Air Complaint program like in New York City. This program allows witnesses of prolonged truck idling to record the violation, submit time and date stamped video proof, and collect 25% of the city-collected fine.
- This tactic can cause discomfort for resident enforcers and for drivers of idling trucks who receive the fines. A high degree of community engagement and education is needed to solidify the viability of this enforcement technique.
- Include resident-involved idling reporting on Chicago's 311 mobile phone application.
- Case study:

  NYC Citizens Air Complaint Program, Idling Complaint System

  - In New York City, it is illegal for trucks and buses to idle for more than three minutes (or more than one minute when adjacent to a pre-K-12 school). Yet, trucks and buses still idle often. To enforce this regulation, citizens who witness idling violations (10 seconds or more beyond the three- or one-minute limit) can anonymously contact 311 or file an online complaint. A completed complaint must be submitted within 60 days of the observation. For more details on the Citizens Air Complaint Program, visit the link above.

Enforce truck restrictions

- Enforce existing diesel truck restrictions regarding 1) prohibited truck location on certain roads, and 2) truck idling.
- Ticket trucks on restricted roads and charge fines to the company and facility owners rather than truck drivers and operators. Charging owners rather than drivers assures the financial burden does not go to the individual worker.
- Reduce the number of exemptions to the idling ordinance and allow residents to report idling violations using the 311 mobile app (and receive a share of the fine to incentivize reporting).
- Increase company-charged fines for idling violators, and fine company violators by associating the truck with its origin or destination.
- Continue with non-police/sheriff enforcement of truck restrictions post-electrification, with enforcement conducted by other city departments.

Require GPS trackers on fleets

- Require GPS trackers for trucks operating in the City. As a first step, trackers could be required on any trucks funded through the City truck replacement program for city-owned vehicles. Secondly, require the use of GPS fleet trackers for any warehousing industry or company that wants to operate within a community already overburdened by diesel trucking impacts.

- GPS trackers, retrofitted within the EV truck design, would provide needed data on the truck's location and vehicle class while aiding community enforcement against idling. Often these are already included within newer vehicles and accessible by the Original Equipment Manufacturer (OEM). In California, tracking of truck moves for certain public sector funded programs is the responsibility of the OEM, which they agree to as a condition of receiving public funding for equipment purchases.

- Community enforcement and control, rather than merely data collection, should be the primary focus for GPS tracking. GPS data should be reported in aggregate rather than individual trip details with point-to-point route information to curtail privacy concerns but should be broadly available beyond the City to residents and community organizations.

Category 3: Siting standards and regulations for truck-intensive facilities

Regulatory/Policy Actions

Order a Cumulative Impacts Ordinance

- Before the city or agency issues a permit to advance an industrial operation, the effects of an additional facility must be considered in the context of neighborhood baseline pollution levels and other environmental concerns. Ordering a cumulative impacts assessment is important to prevent disproportionate exposure in a community and requires data on the differences in baseline environmental impacts across communities. The City is now in the early stages of developing a Cumulative Impacts Assessment for analysis and decision-making purposes and is also exploring options to incorporate the assessment tool into a Cumulative Impacts Ordinance.

- The results of a Cumulative Impacts Ordinance could further bolster size limitations on warehouses in industrial corridors.

- Case study:

  Newark, New Jersey Cumulative Impact Ordinance

  - In 2016, Newark implemented the first Cumulative Impacts Ordinance of its kind by addressing the disparate health impacts faced by low-income and BIPOC communities. The Ordinance aims to protect the health of all residents, mitigate pollution, encourage

developments that have well-rounded positive impacts, inform decision-making by centering public and environmental health, and promote meaningful community engagement.

Authorize a moratorium (warehouses and other freight-related uses)

- Authorize a moratorium on the construction of new warehouses and other medium-duty and heavy-duty freight-related uses. Use the period of the moratorium to update regulations and make investments to manage truck traffic in the longer term. This option gets to the root issue, as fewer new warehouses halt the increase of trucks and freight-related environmental harms.

- Case study:

  Mansfield, New Jersey prohibits the construction of new warehouses by enacting a WHEREAS ordinance

  - As of March 2022, the City of Mansfield in Burlington County banned new warehouses from entering the township after a previous warehouse boom in the area. Residents fear further industrialization of the area and the negative impacts it would have on their rural quality of life. Concerns for freight congestion, degraded air quality, and industrialization on undeveloped land motivated this moratorium. Previously approved warehouses continue to be under construction while this moratorium is in effect. Coinciding with this ban, city officials aspire to update the City's master plan to protect against potential legal opposition and to reflect public sentiment.

Rethink industrial corridor planning

- Based on the demands of neighborhood groups and historically marginalized Chicago communities, rethink the industrial corridor planning processes. Environmental and health effects should be considered alongside economic development, jobs, and transportation. Coordinate industrial planning efforts with other citywide and neighborhood/sub-area level planning efforts (e.g., We Will Chicago, Climate Action Plan, quality of life plans, etc.).

- Rethinking industrial corridor planning includes changing unlawful planning, zoning, and land use policies. As stated in HUD's letter, dated July 2022, the City of Chicago is accused of violating Title VI of the federal Civil Rights Act of 1964: "The city strongly influences where heavy industry is sited," and "has largely chosen to use this influence to redevelop formerly industrial areas in white neighborhoods."

Category 4: Capacity, design, and performance standards for truck-intensive facilities

Regulatory/Policy Actions

Apply Sustainable Development Policy actions

- In ongoing revisions to the Sustainable Development Policy, ensure it has items relevant for warehouse development. Updates to the Sustainable Development Policy for 2023 are currently evaluating considerations for improved freight movement management.
- Whether through the Sustainable Development Policy or other regulatory/incentive actions, add green features to warehouse design and construction including green rooftops, LEED/ASHRAE building certification, shaded parking lots, and exceeding requirements of the City of Chicago stormwater management ordinance. Focus on those that reduce the urban heat island effect and improve localized environmental outcomes.

Require buffers around sensitive areas, including vegetative buffers and GSI installation

- Require the installation of buffers by warehouses near sensitive areas like schools, parks, and public spaces. See the Bay Area Air Quality Management District's Policy Strategy for Vegetative Buffers on best design practices for buffer height, density, spacing, selection, and maintenance.
- Strategically use natural buffers to mitigate air, noise, and light pollution emitted from warehouses. To create the most impact, natural buffers should preferably be coniferous tree species, include co-implementation with green stormwater infrastructure like native rain gardens or bioswales, and be significant in size. Priority locations for natural buffers should be near warehouse entrances and exits and locations near public community areas.
- Vegetative buffers are not a singular solution but are rather for use alongside electrification and other efforts. Likewise, this includes an extra commitment to air filtration systems installation and use.
- Planting these buffers should intentionally avoid green gentrification by involving local residents in the decision-making process and pairing with anti-displacement strategies.

Create building size limitations

- Limit the size allowed for individual warehouses and the cumulative area of all warehouses in industrial zoned land.

Regulate and track entrance and exit siting

- Regulate and track the number of vehicles that enter and exit any given warehouse. Site exits and entrances to reduce travel in residential areas.

Support indirect source rule**

- Support state legislation for an indirect source rule regulating NO_X and PM emissions from trucks serving warehouses. According to California's South Coast Air Quality Management District (SCAQMD), indirect source rule "seeks to reduce nitrogen oxide and particulate matter emissions produced by light- and heavy-duty trucks and tractor-trailers (mainly diesel) traveling to and from warehouses by regulating the owners and operators of warehouse facilities, alleged to be the indirect source of those emissions."

- This could look similar to Rule 2035, California's Warehouse Indirect Source Rule (WAIRE) program. WAIRE is a points-based system that allots WAIRE Points based on actions taken from their WAIRE Menu, implementing a Custom WAIRE Plan, or paying a mitigation fee.

Require electric onsite equipment**

- Electrify non-freight vehicles, like forklifts, within warehouses and industrial manufacturing facilities.

- Case studies include:

  https://www.slideshare.net/emmaline742/forklifts-utility-programs-by-alene-walkington

  https://www.slideshare.net/emmaline742/whats-unique-about-energy-metrics-for-ev-terminal-tractors-what-are-the-key-drivers-by-brad-wham

  https://www.youtube.com/watch?v=4Y8tqJkpCQA&feature=youtu.be

Require installation of onsite energy systems such as solar panels

- Require installing renewable energy power, including but not limited to photovoltaic technology, for all energy use within warehouses and industrial manufacturing facilities. This supports the City's ongoing Sustainable Development Policy on solar power energy use.

- The City of Chicago will need coordination with and clearance from Commonwealth Edison (ComEd), Illinois' largest electric utility provider, to accomplish this.

Requirements on facility occupancy and use

- Screen business licenses for any past environmental issues or labor disputes. To be considered for a business permit, new warehouse facilities should be required to pass a compliance review by not having existing violations. To attain and maintain a permit, warehouses must include the total number of warehouse trucks (warehouse-owned or serviced by third parties) as well as demonstrate traffic study accuracy and consistency.

- This strategy includes creating and enforcing a set of standards for warehouse facility violations (in a similar vein to the existing industrial standards).

Investments/Incentives

Fast permitting for electric-only warehouses

- Incentivize rapid approval of business permits for new warehouses that only use electric fleets and onsite equipment sourced from renewable energy.

Fund installation of onsite energy systems and other sustainability features

- Fund the installation of renewable energy power for all energy use within warehouses and industrial manufacturing facilities. This includes rooftop and carport solar. Incorporate solar panels onsite to promote a self-sustaining and net-zero emission design in-line with vehicle electrification efforts. This supports the City's ongoing Sustainable Development Policy on solar power energy use.

Enforcement (Without Policing)

Consistently penalize companies for permit violations, including deviations from traffic studies

- Consistently penalize company warehouses with fines for environmental and labor permit violations within a reasonable timeframe of the violation.
- Consider accurate traffic impact studies to be an enforceable commitment, with fines for violations.
- Use GPS tracker enforcement to report vehicle number estimates to confirm the accuracy of the number of existing vehicles used by warehouse facilities. Fine companies who fail to accurately provide vehicle estimates.

Category 5: Charging infrastructure

Regulatory/Policy Actions

Require the installation of vehicle chargers within new developments

- Require warehouse developers to provide sufficient on-site medium-duty and heavy-duty vehicle chargers.

Investments/Incentives

Fund installation of vehicle chargers (on-site and off-site)

- Plan for and fund off-site vehicle chargers for medium-duty and heavy-duty vehicles. Fund the installation of onsite renewable energy derived vehicle charging infrastructure. Use part of the $149 million in federal funding allotted for Illinois' electric vehicle charging network for

community-decided EV charging locations in Chicago, and ensure that IDOT allocates funding to heavy-duty charging stations and not just private vehicle charging.

- Consolidate electrification efforts with a thoughtful consideration of placement. Medium and heavy-duty vehicle charger placement should include a social equity lens for the planning, distribution, and deployment of chargers to assure already burdened lower-income communities do not face further harms. Co-decide locations of on-site and off-site vehicle chargers with community members and neighborhood groups.

- Off-site charging includes infrastructure on parking lots adjacent to highways, like south of I-55 on Pulaski. Highway-adjacent lots with overnight parking would be advantageous for overnight charging rather than high-powered fast-charging.

Use IIJA funds for heavy-duty vehicles

- Explore opportunities to use Infrastructure Investment and Jobs Act (IIJA) federal funding for the state of Illinois to subsidize the purchase of medium- or heavy- duty zero emissions vehicles (IIJA, Sec. 11115).

Category 6: Road, bridge, and similar off-site infrastructure

Regulatory/Policy Actions

Apply road pricing for trucks

- Truck fleet electrification is important to mitigate health hazards, yet it does not solve the issue of congestion especially on or near residential streets. Congestion or cordon pricing would help regulate the number of trucks on these roads and raise funding for mitigation measures.

- The fee should only be applied to companies rather than truck drivers/employees. Fees from this program should be used for infrastructure improvements and community-defined ideas to mitigate the damage and impact caused by trucks.

- Implement congestion pricing schemes to reduce trucking impacts, especially related to road congestion. Warehouses and corresponding buildings are assigned specific delivery days and surcharged outside of these days.

Investments/Incentives

Improve bike and pedestrian infrastructure

- Prioritize funding for High-Crash Corridors in Industrial Corridors and roadways with higher-than-average truck traffic.

- Heavy-duty trucks pose danger to vulnerable road users even if they are upgraded to EVs. A variety of infrastructure investments would mitigate this problem.

- Install new sidewalks and better maintain pre-existing sidewalks and safe crossings for pedestrian use.
- Install protected bike lanes on streets where conflicts between bikes and trucks present safety concerns.
- Due to public health concerns regarding particulate matter concentration exposure, promote alternative bike routes away from streets with high truck traffic. Involve active transportation advocacy groups and community organizations in planning for this.

Restore tree canopy and green infrastructure in right of way

- With $46 million in funds from Chicago's historic tree equity strategy, not only plant new trees but restore existing tree canopies city-wide while targeting historically marginalized neighborhoods. Tree cover sequesters carbon and combats heat island effects. Planting and restoring trees should co-occur with community input to avoid green gentrification.

Category 7: Data collection and goal setting

Regulatory/Policy Actions

Require installation of air quality monitors

- Require companies to install research-grade air quality monitors around truck-generating facilities to evaluate emissions controls. Make the data publicly available.

Create targets for improving air quality and health outcomes

- Rather than simply measuring pollutants such as PM_{10}, $PM_{2.5}$, black carbon, nitrogen oxides, and other criteria and non-criteria pollutants, set targets for reductions in these pollutants to end disparate community health outcomes.

Investments/Incentives

Fund and improve air quality monitoring & data collection

- Acknowledge the vast body of existing research on disparate freight sector impacts on communities. More data collection is not needed to showcase these well-known impacts—enough is known to make improvements and immediately begin electrification and harm reduction efforts. Rather, data collection would help define and mitigate disparities to address and ground truth in partnership with communities.
- To mitigate harm 1) use datasets to quantify emissions for a range of pollutants (not just $PM_{2.5}$), and 2) fund data collection on neighborhood-scale truck pollution and truck traffic activity.

- Data should be collected in equitable partnership with communities. Collection is only a means and not an end—pursuing data collection should lead to strategic community-centered improvements. Although challenging to accomplish, data needs to be trusted by communities *and* reliable for regulatory use.

- Fund new mobile and stationary air quality monitors to collect consistent, comparable data. Conduct further research to determine which sensors provide results that are most able to be co-owned by communities. Determine consistent data specifications for how air quality data should be reported by sensors.

  - CNT, UIC, LVEJO/CEJN, and CDPH recently collaborated on an Environmental Justice assessment effort to design and implement a community-driven air monitoring program to identify local air quality issues and evaluate disparities across the City of Chicago. This effort has received $2.0 million in federal funding through the FY23 Omnibus Appropriations Act.[86]

- Maintain Chicago's existing air monitoring network, including monitors installed by nonprofit groups, Microsoft, and all others. Determine future locations with leadership by local environmental justice groups.

Category 8: Other

Regulatory/Policy Actions

Authorize regionwide freight authority**

- Authorize a new government unit with authority to regulate local industry trucks and freight within the CMAP metropolitan area. Suggested models for authorities like these are an area for further research.

Require Community Benefits Agreements

- Require negotiating Community Benefits Agreements (CBA) between developers and local community members. These legally binding contracts require community-chosen commitments that developers prioritize and implement to address community needs. Successful CBAs detail how community goals will be achieved, reporting requirements on promises made within the negotiated agreement (including prohibited actions), and consequences of noncompliance.

Require full electrification

- Require that new city-owned vehicles are electric to eliminate emissions and exhaust from engine combustion.

[86] Duckworth, Durbin Secure $182 Million for Illinois Projects FY23 Omnibus Appropriations Bill | U.S. Senator Tammy Duckworth of Illinois (senate.gov).

  - In April 2023, the Mayor's Office announced a commitment of $42 million for its Municipal Fleet Electrification Initiative. This program is designed to transition 100% of Chicago's municipal fleet to zero-emission vehicles by 2035.[87]

- Industrial vehicle electrification will reduce partial but not total nonpoint pollution. Promoting total nonpoint pollution reduction for all vehicle classes, alongside ongoing public bus electrification and local renewable energy use, will improve overall local air quality and help mitigate climate change.

Improve warehouse worker labor standards

- Require companies to directly hire-on workers from the first day of their employment and forgo temporary agency hiring. This will allow workers to immediately receive benefits and improve their quality of life. Require acceptable pay as condition of city permit.

- Require supply chain companies to improve warehouse worker labor standards in conjunction with vehicle electrification investments and regulations, including prioritization purchases of vehicles made by companies who treat their employees fairly.

- These improved warehouse worker labor standards should create a Just Transition to electrification, as stated in the 2022 Warehouse Workers for Justice[88] 'For Good Jobs & Clean Air' report: "Bearing in mind that the jobs of truckers and some warehouse workers might look quite different in an electrified world, looking to workers to provide leadership on what their needs will look like around training, affordability, and working conditions is a way to ensure a fair progression to EVs."

Require installation of increased air filtration systems

- Require truck-intensive warehouses and facilities located close to vulnerable areas, especially schools, parks, and senior centers, to provide sufficient high-quality air filtration systems.

Investments/Incentives

Have authentic and adequately funded community outreach

- Across City departments and programs, there is a need for improved outreach to the public and specifically to community-based organizations. Authentic outreach is important to co-create solutions with vulnerable frontline communities and the organizations that serve them. Intentionally involving the public and community-based organizations before, throughout, and after projects and programs ensures social equity as a process. Outreach and involvement can

[87] City of Chicago :: City of Chicago Commits $42M to Municipal Fleet Electrification Initiative, Chicago Electric

[88] Warehouse Workers for Justice (WWJ) is a 501(c)(3) non-profit and worker center aiming to win stable, living wage jobs with dignity for the hundreds of thousands of workers in Illinois' logistics and distribution industry.

empower communities to help address the environmental and health-related problems they disparately face.

- Case study:

  Rancho Cucamonga, California city-community partnership

  - Rancho Cucamonga is a city in California with a large population of Latine residents who live in food deserts and experience food apartheid in southwest areas of the city. To increase areas zoned for farmer's markets and identify community garden sites, the City Manager's office housed Healthy RC, a city-community partnership.

  - This collaborative partnership first had residents included in the early assessment and data collection processes. Other collaboration strategies included focus groups, interactive community surveys, and interviews with farmers marker managers and farmers. Also, the City's GIS department launched a mobile app for residents to take pictures of infrastructure needs (resident data collection) and had residents offer design feedback on the app's features. This led to displaying community-identified needs. City-held forums, having resident leaders, and informal city hall visits further engaged the community. In developing the strategic plan, one in five Rancho Cucamonga residents were reached out of 180,000 residents total. When city staff talk to residents, titles are left at the door.

  - "With this approach, city officials and leaders view themselves as conveners and stewards, and citizens view themselves as partners and change agents…This type of authentic partnership is achieved by intentionally developing relationships; offering capacity-building training and resources for adults and youth; and ongoing engagement through council workshops and neighborhood meetings."

  - The City staff changed internal operations by approaching "large-scale policies in teams, with multiple departments collaborating to address health and wellness."

Fund installation of increased air filtration systems

- Use existing funding pools to increase the quality and quantity of air filtration systems near schools, parks, and community areas. Set this strategy as a high priority because schools are increasingly located in industrial corridors.

Prioritize contracting with companies that commit to electrification

- City departments could prioritize City contracts to trucking companies that aim to electrify their fleets and other equipment and machinery, and to firms that commit to using trucking companies that have these characteristics. Sister agencies like CPS and CTA could also be included in this prioritization.

- In construction and other procurements, additional preference could be given to contractors that electrify their machinery.

Enforcement (Without Policing)

Create a compliance authority

- The City of Chicago should be responsible for monitoring compliance when new regulations (like enforcements against truck idling and other violations) are passed and when new warehouses and facilities are approved. Create a congregate compliance authority between City Departments for this responsibility, ensuring companies are properly held accountable.

Enable resident reporting back to compliance authority

- Allow and encourage residents and community leaders to report trucking non-compliances to the City's compliance authority.
- This is in conjunction with 311 resident idling reporting.

Non-Recommendations: Strategy Annotations

The group identified several strategies that are explicitly not recommended, listed below.

Using biofuels (ethanol, etc.)

- Although not from conventionally sourced fossil fuels, biofuels like ethanol, biodiesel, green diesel, and biogas still produce carbon dioxide and nitrogen oxides during combustion. Due to these emissions, biofuel is a false solution as it contributes to greenhouse gas emissions and air pollution.
- *Source: The International Council on Clean Transportation*

Using hydrogen fuel

- Blue hydrogen (derived from natural gas/methane) should never be used as an alternative to diesel use. Green hydrogen (derived from renewable energy sources) should only be considered if electrification is not technically feasible. However, green hydrogen fuel cells are still in their exploratory phase, and along with being more costly and energy inefficient than electric vehicle engines, it cannot be considered an actual solution during this time.

Offering off-hour delivery programs

- These programs are meant to move hours of truck deliveries to off-hours like nights and weekends, reducing daytime congestion.

- However, this is not an ideal solution because it does not balance community health with warehouse worker health (recognizing warehouse workers are also community members). Off-hour 'graveyard' shifts can impair the metabolic processes and circadian rhythms of workers, while nighttime truck noise and lights may disrupt sleeping residents.

- *Source: National Institute of Health*

Other References

The strategies above were generated from discussion among nonprofit partners in Chicago and focused on actions that could be taken by the City of Chicago. Other useful resources that provide additional strategies include:

- CARB's strategy priorities, based on their regulatory authority: https://ww2.arb.ca.gov/sites/default/files/2021-04/20-016%20Factsheet_ZE%20onroad%20strategies.pdf.

- The NESCAUM (Northeast States for Coordinated Air Use Management) action plan: https://www.nescaum.org/documents/mhd-zev-action-plan-public-draft-03-10-2022.pdf.

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Finally, CNT credits NRDC's February 2022 "Policy Scan: Addressing Impacts of Trucks & Truck-Intensive Facilities" for directly informing the structure of our Strategy Matrix.

Appendix D. 31st Street Corridor Study

The 31st St. Corridor is an example of a location that faces challenges that are shared by mixed-use corridors throughout the city. As part of the SWICTS effort, CDOT conducted a Corridor Study of a two-mile stretch along W. 31st Street in Little Village between Sacramento Avenue and Kostner Avenue. The purpose of the 31st Street Corridor Study was to assess the localized impacts of freight movement and develop a toolkit of mobility and quality-of-life improvements that could address community concerns and priorities. This corridor was selected as a microcosm of truck issues throughout the SWICTS study area, and its approach, analysis, and toolkit of solutions are intended to not only improve conditions in the corridor but inform future corridor studies and improvement efforts throughout the study area.

There has been significant research and outreach done, both previously and during this study, to identify and understand these issues. With 31st Street serving industrial land uses, it carries a significant amount of truck traffic, which impacts the travel experience for other community users who walk, bike, take transit, or live in the surrounding neighborhoods. The 31st Street corridor also has many planned developments that will increase its use, and better understanding of the existing challenges and opportunities will help inform potential improvements to improve the quality of travel experience for all users along this route.

Figure 19. Map of 31st Street Corridor Characteristics

Challenges identified on 31st Street include: road safety concerns in certain areas, especially for pedestrians and bicyclists; poor sidewalk conditions and gap; high truck volumes among residential land uses; needed improvement to transit access, comfort, and ease; limited bicycle connections;

wide travel lanes limiting space for other uses; and a limited healthy tree canopy. Examples of these challenges are shown in **Figure 20** below.

Figure 20. Photos of 31st Street Pedestrian Environments

Bus stop at 31st Street and Lawndale Ave.

Crosswalk at 31st Street and Kostner Ave.

Several city and partner agency policies and initiatives are also looking closely at these issues, including the Neighborhood Bike Networks, the SWICS study, and Vision Zero. The 31st Street Corridor Study conducted several rounds of community engagement to determine if several treatments identified through the other studies are desirable along the corridor.

A framework was developed to outline criteria and priority ranking of different tools that could be applied along 31st Street in the form of recommendations. These recommendations were organized into the 31st Street Design Toolbox and consisted of policies and infrastructure solutions designed to enhance safety, improve multimodal accessibility, improve air quality, and better the quality of life for residents along the corridor. The Toolbox presents the benefits associated with each recommendation, the considerations necessary for successful delivery, and the timeline associated with delivering different projects that fit under the recommendation. Examples of the Toolbox solutions are presented in **Figure 21** below:

Figure 21. 31st Street Corridor Toolbox Examples

The 31st Street Corridor Study also presents solution concepts for key locations along the corridor where large activity centers, such as schools, parks, or major intersections, are located or where gaps in the pedestrian network raise safety risks. For these key locations, the Study provides overhead visualizations that demonstrate how different solutions from the Toolbox could be integrated into the existing corridor geometry. These visualizations are accompanied by brief discussions of partners with which CDOT should coordinate in order to ensure successful implementation of the solutions. An example of these solution concept visualizations is presented in **Figure 22** below:

Figure 22. 31st Street Corridor Study Key Location Solution Visualization

KEY LOCATION: 31ST STREET AND KOSTNER AVENUE

Key Destination: Little Village High School

OBJECTIVES	STRATEGIES	ADDITIONAL COORDINATION
Make it safer for people walking and improve the experience of taking the bus	• Re-evaluate traffic signal timing for the opportunity to add a leading pedestrian interval and improve traffic flow along 31st Street • Align north-south sidewalks on west side of Kostner Avenue • Reduce curb radii • Add bus shelters • Add trees along Kostner Avenue and 31st Street edges • Align southern crosswalk	• Little Village Lawndale High School campus: World Language High School, Social Justice High School, Infinity: Math, Science and Technology High School, and Multicultural Arts High School • Coordination and communication with IDOT and CTA is needed

A final section of the report identifies a variety of activities for CDOT to pursue in coordination with other entities, including other City departments, City and State agencies, and stakeholder and community groups. The final report discusses the opportunities and applications of these recommendations along the corridor.