

STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND THREATS ANALYSIS REPORT

March 2023

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Introduction to the Freight Strengths, Weaknesses, Opportunities, and Threats Analysis Report

Overview

For the region to meet its freight mobility potential, there must be an understanding of what the region has to offer and what is holding it back. This analysis provides an assessment of the OKI region’s strengths, weaknesses, opportunities and threats (SWOT).

Figure 1: SWOT Diagram

Objective: Understand the core freight movement strengths and weaknesses of the OKI region, and how external factors may influence decision-making.



Summary of the Key Freight SWOTs for the OKI Region

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| <p>Strengths</p> <ul style="list-style-type: none"> • Reduction in truck involved crashes • Roadway infrastructure is in a good state of repair • Robust interstate highway network for intra- and inter-regional truck mobility • Extensive and growing air express and air cargo operations – home of two international air cargo commercial hubs and seventh largest North American air cargo airport by tonnage • Efficient transportation linkages between air freight gateways and high-tech sectors • Availability of eight public airports for potential UAV/VTOL activity as cargo vertiports | <p>Weaknesses</p> <ul style="list-style-type: none"> • Roadway congestion • Lack of sufficient truck parking • Large number of bridge strikes due to low vertical clearances in some locations • Significant number of public rail at-grade crossings causing blockages and delay to roadway travelers, as well as noise pollution from train horns • Class 1 freight rail chokepoints due to limited infrastructure capacity and growing volumes • Short line railroads have infrastructure and financial constraints restricting use of industry standard 286K-pound rail |
|---|--|

| | |
|---|---|
| <ul style="list-style-type: none"> • Efficient Class I and short line freight rail connections • Major Class 1 freight rail intermodal facilities • Access capacity for expanded river freight activity and modal shift • Rail, road and pipeline access to inland river port shipping • Excellent air cargo, barge freight, and pipeline network safety records • Growing regional population attracting more e-commerce | <ul style="list-style-type: none"> • cars and their ability to conduct basic, regular maintenance • Limited riverfront property for expanded maritime freight access • Sections of the freight network are susceptible to flooding • Lack of sufficient workforce across all the modes – impact on freight reliability |
| <p>Opportunities</p> <ul style="list-style-type: none"> • Increased general air freight • Improved resiliency of the freight network • Expanded discretionary federal funding opportunities for freight projects • Improve safety and reduce incidents associated with freight transportation such as bridge strikes and truck crashes • Reduced rail and traffic conflicts through a targeted public/private program of addressing at-grade crossings • Railroad companies’ interest in partnering with OKI communities to eliminate at-grade public crossings • Anticipated increase in goods moved by almost every mode • Growth in companies wanting to build/expand manufacturing facilities with rail access • Interest from public agencies in advancing waterborne, rail and/or trucking-supporting development • Growth of Container-on-Barge • Reduction of greenhouse gas emissions from adoptions of cleaner, alternative fueled freight vehicles and machinery • Increased “life” of freight infrastructure through the development of new materials and maintenance processes • Improvements to quality of life through the decline in freight-related noise pollution from | <p>Threats</p> <ul style="list-style-type: none"> • A global energy market in transition (e.g.: coal decreases (detriment to barge and rail), natural gas increases (boon for pipeline)) • Shortage of labor in freight related sectors • Reduced reliability of freight network due to increased overall traffic • Competition between trucking and rail industry with trucking industry’s desire to be permitted to carry heavier and longer loads • Reduced reliability of region’s connectivity to global markets due to extreme weather conditions (e.g., drought conditions causing low water levels on Mississippi River) • Civil unrest and terrorism • Impact of freight growth may adversely impact disadvantaged communities • Passenger rail expansion on freight rail mobility/reliability Barge capacity limitations at Ohio River lock and dam network • River tonnage expected to decline |

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|--|--|
| <p>the introduction of new technologies and policies</p> <ul style="list-style-type: none"> • Improved safety, maintenance, mobility, and economic competitiveness through new technological advancements | |
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OKI Freight Goals Framework

The OKI region’s future freight network includes the current infrastructure and the changes that will be made over time, such as capacity enhancements, safety improvements, and projects that bring it up to a state of good repair. The OKI freight goals provide the framework for prioritizing efforts to improve future freight transportation in the region.

With these goals in mind, evaluating the strengths, weaknesses, opportunities and threats helps focus our analysis to address those issues critical to enhancing future freight movement and economic growth for the OKI region.

Safety

The freight transportation system should work to reduce the risk of crashes that cause death or injuries for the traveling public; minimize risks to shipments and property damage; and ensure the safety, health and well-being of freight employees.

Infrastructure Condition

The preservation, maintenance and optimization of the region’s existing freight transportation system and infrastructure is a core value. The state of good repair is improved through the use of innovation, advanced technology and performance management.

Mobility and Reliability

This goal involves system performance and how well commodities can move with greater speed and less congestion to improve efficiency. Recommendations that remove freight bottlenecks, or add capacity to handle growing freight demand, ensure reliable travel times and deliveries. At the same time, resiliency of the freight transportation network against the impacts of extreme weather and other potential forces -- such as security threats -- is a growing consideration.

Environmental Sustainability

Today, greater focus is placed on strategies that promote effective and efficient use of natural resources that reduce adverse environmental and community incidents. Decreasing mobile source emissions, noise pollution and non-renewable fuel usage have beneficial effect on the region’s quality of life. They also promote a more sustainable future

Economic Competitiveness

The transportation network is critical to the economic vitality of the region: It enables national and global competitiveness, productivity and efficiency. Harnessing the region’s transportation

assets and offering strong performing multi-modal freight options support business retention, expansion and attraction.

Safety Strengths, Weaknesses, Opportunities and Threats

Strengths

Declining Truck-Involved Crashes

Of the region's 325,090 crashes from 2016 through 2020, truck-involved crashes comprised only 6.4%, or 20,889 crashes. During this same period, truck traffic along key interstate segments increased 32% to 180% across the OKI region. This combination of a drop in truck-involved crashes and increase in truck volumes shows the benefits of the safety-focused projects and policies initiated by the region and its partners.

River, Air and Pipeline Safety Records

Compared to roadways and rail, the region's other modes have a very good safety record. There is no record of fatalities associated with these freight modes over the past decade, and records show a minimal number of injuries.

Regulation Revisions

While companies operating in the OKI region have an excellent safety record, revisions to regulations (such as the Federal Pipeline Safety Regulations) will ensure continued safety and security. This will be done through enhanced monitoring of existing conditions as part of maintenance and replacement programs.

Weaknesses

High Number of Truck Bridge Strikes

Between 2016 and 2020, 16 bridge locations in the region had a combined 100 truck strikes due to lack of sufficient vertical clearance. Fourteen of those strike locations were railroad bridge overpasses.

Lack of Sufficient Designated Truck Parking

The lack of sufficient short- and long-term truck parking infrastructure creates safety and reliability issues across the region. Findings show that trucks arrive to park in designated public and private spaces chiefly from 6 p.m. to 6 a.m. The time they remain parked varies; however, the largest percentage of dwell time is either less than one hour or more than 10 hours. Findings also show that undesignated roadside truck parking on interstates and on/off ramps is more evident outside the I-275 ring. Lack of truck parking has been a high concern in Boone County for several years, due to the growth of e-commerce and air-to-truck cargo deliveries. Recent data shows that Warren and Butler counties, especially along the I-71 and I-75 corridors, are experiencing greater incidents of undesignated truck parking.

The Ohio Truck Parking Study identified high-priority undesignated truck parking clusters in the downtown area, due to last-mile and urban delivery parking issues; and along I-71 and I-75, due to supply-demand imbalance at truck parking facilities. Analysis of truck stops during 2019

showed that about 6,790 trucks parked for an average of about four hours in undesignated locations in this mega-cluster. Truck parking issues in this area have led to 20 truck crashes. The peak number of undesignated truck parking in the Cincinnati mega cluster is between 11 p.m. and 7 a.m. About 65% of trucks parked on undesignated locations in this cluster stopped for short breaks of less than 3 hours, while 27% parked for longer Hour of Service compliance breaks of more than 8 hours. (Source: Ohio Truck Parking Study. Ohio Department of Transportation. (May 2021).)

The Kentucky Transportation Cabinet (KYTC) completed a Truck Parking Study in early 2023. As part of this study, KYTC identified the rest areas in Northern Kentucky on I-71/75 Boone County as among the state's highest priority locations for truck parking concern. The Cabinet is currently looking at expansion options to increase capacity and improve safety.

Truck HAZMAT-Related Events

Trucks account for nearly all Hazardous Material (HAZMAT) incidences reported for the past two decades. During this time, the number of truck-related HAZMAT incidences has increased by more than 145% and the quantity of HAZMAT released has risen more than 256%.

Rail Grade Crossings and Trespassing

Compared to roadway crashes involving trucks, railroad-related crossing and trespassing injuries and fatalities are very low. However, rail crossings remain a safety concern particularly when they are blocked by a parked or slow-moving train, which cause emergency vehicles to use alternate, and many times, longer routes.

From 2016 to 2020, 66 safety incidents at rail grade crossings in the OKI region were reported to the Federal Rail Administration (FRA). Fifty-four (54) incidents were at public crossings and 12 at private rail grade crossings. Over this period, there was some slight fluctuation in the number of incidents; yet, overall, the number of rail grade crossing events has remained about the same. In the OKI region, the rate of fatalities and injuries at rail grade crossings have remained fairly constant between 2016 and 2020. About 12% of all safety incidents at rail grade crossings over the past five years have involved a fatality and 35% involved an injury.

In addition, privately owned railroad right of way is often used as a route for those walking or even driving as a more direct way to their destination. Between 2016 and 2020, the total number of trespassing injuries (47) and deaths (16) in the region was double that of rail grade crossing injuries (23) and fatalities (8). Every trespassing incident resulted in injury or death. In the OKI region, the number of trespassing incidents has remained about the same, as has the occurrence of injuries and fatalities, ranging between seven to 12 people injured and two to four people killed each year.

Opportunities

Truck Strike Avoidance

The region has an opportunity to improve safety by reducing incidents with freight transportation, such as bridge strikes and truck crashes. For example, using technology such as overheight warning systems to protect critical infrastructure and improved signage could be used at truck crash hotspots to reduce the number of truck crashes.

Truck Parking Optimization

Opportunities to address truck parking shortage in the region include expanding the number of spaces at rest areas and opening unused or closed weigh stations for overnight truck parking. In addition, truck parking technologies can help to optimize available truck parking and increase safety. These technologies communicate availability which can range from low tech (a large, paved parking lot) to high tech (real-time occupancy data provided to smartphone apps). Some potential enabling technologies for the latter include, but are not limited to:

- **Occupancy detection:** Sensors will be required to provide real-time estimates of the number of free trucking spaces in a lot. This can be accomplished by tracking in and out movements, video-based detection, or occupancy sensors in individual spaces.
- **Dynamic message signage:** Occupancy detection will need to be linked to roadside signage indicate upcoming parking availability to truck drivers.
- **Data platform:** The freight traveler information platform described previously could be extended to provide parking availability information to third-party applications.

Additional opportunities include the availability of discretionary funding grants through the Infrastructure Investment and Jobs Act (IIJA) with specific program merits addressing safety.

Rail Crossing Eliminations

Another opportunity is reducing rail and traffic conflicts in urban areas through a targeted program of removing at grade crossings with new bridges and underpasses and potential reconfigurations of freight and rail yards so that their operations have less impact as a result of frequently used and blocked at grade crossings. Railroad companies in the region have been very supportive of eliminating as many crossings as possible as it improves safety and railroad efficiency.

Active Rail Crossing Safety Devices & Real Time Communications

The push to improve passive grade crossings to active ones (static warning devices to actuated and physical crossing barriers) is a shared goal by railroads and roadway owners. These safety measures would entail the construction of improved and expanded use of crossing control devices, such as bells, flashing lights, and gates at more than 400 public grade crossings in the OKI region.

For the past few decades, FRA has supported research into new technologies for improving grade crossing safety. One research example is the use of Intelligent Transportation Systems (ITS), which can use dedicated short-range communication (DSRC) and Differential Global Positioning Satellite (GPS) systems, as well as video detection and monitoring to detect crossing blockages. The FRA-developed technology is called Intelligent Crossing Assessment and Traffic Sharing System (i-CATSS), which provides first responders with crossing blockages in real-time,

so they can modify their emergency routes. Widespread adoption of these systems and others is an opportunity to increase the safety of at-grade crossings in the OKI region.

(Source: Federal Railroad Administration. Intelligent Crossing Assessment and Traffic Sharing System (i-CATSS). Technical Reports Document Series. Report Number: DOT/FRA/ORD-22/15. April 2022).

Recent Federal Derailment Prevention Measures

As a result of the Feb. 3, 2023, Norfolk Southern train derailment in East Palestine, Ohio, which involved 11 rail cars containing hazardous materials, Senators Vance, Brown, Hawley, Casey, Fetterman and Rubio have introduced The Railway Safety Act of 2023. The proposed legislation is based upon the belief that the current railroad safety measures may not be adequate for the safety and wellbeing of U.S. citizens and communities. In summary the bill:

- Applies elements of the current regime for High Hazard Flammable Trains, such as restrictions on train length, routing and notification requirements, to other hazardous material trains.
- Creates minimum time requirements for human inspections as well as an auditing regime for inspections to be conducted by the Department of Transportation, while protecting the right of the Department to run pilot programs on automated track and rolling stock inspection systems.
- Requires wayside bearing defect detectors (bearing failure was the cause of the derailment) every ten miles.
- Requires a two-man crew on trains operated by Class I freight railroads, with some exceptions.
- Increases in the civil penalties for violations of rail safety regulations.
- Funds research and training for first responders, as well as research into rail safety.

Passage of this or a similar bill would increase safety inspections and equipment and network improvements performed by the railroads to ensure safety, quality of life, environmental conditions, and economic wellbeing for communities that could potentially be impacted by a hazardous freight train derailment.

Threats

Human-Driven Attacks

Though not common, terrorism and other criminal acts, including cyber-attacks on critical infrastructure could damage and disrupt goods movement for periods of time. This is especially worrisome given the amount of goods moving throughout the region and the size of the trucks, trains, barges, planes, and pipeline carrying them. Within the development of automated freight vehicles, the security of data used to operate these technologies is a topic of high priority and concern.

The Lack of Regular Inspections and Maintenance

Improper or inadequate maintenance of the freight infrastructure also poses a threat to the region. Although the region's roadways are maintained to a state of good repair, owners of private infrastructure such as railroads and pipelines make decisions at a corporate level, which are often not based in the region.

Growing Freight Volumes

Data shows 73% of all crashes and 100% of all fatalities in the OKI region, between 2016 and 2020, at rail crossings had a safety warning device in place. Combined with OKI's forecast for growth in road and rail traffic volumes, this data suggests rail crossing incidences will likely increase in the future.

Infrastructure Condition Strengths, Weaknesses, Opportunities and Threats

Strengths

Roads and Bridges

The region's roadway and bridge infrastructure is in a good state of repair. Because of the topology of our region there are a large number of bridge structures. Between 2014 and 2020, the region saw increases in good and fair bridge conditions.

Class I Railroad Maintenance

Class I railroads report that they are up to date on their maintenance schedules within the region and are routinely inspected.

Weaknesses

First and Last Roadway Miles

The region's freight infrastructure is aging, and it is difficult to keep up with capacity and maintenance needs. Secondary and last mile connections between modes tend to be older and not designed for freight traffic which are need of pavement and geometric improvement.

First and Last Railroad Miles

Short line railroads in the region report they face constant challenges in funding regular maintenance and capital improvements.

Opportunities

Federal Funding

Through the Infrastructure Investment and Jobs Act (IIJA), funding opportunities for transportation total \$283.8 billion. Some programs are available for projects that address state of good repair and congestion reduction. The Brent Spence Bridge secured \$1.6 billion in federal funding through the act (one of the largest grants in U.S. history) to support the \$3.6 billion project. The funding will be used to make significant improvements to the eight-mile Brent Spence Bridge Corridor, which runs from the Western Hills Viaduct in Ohio to the Dixie Highway in Kentucky. The project is scheduled for groundbreaking in late 2023 and completion in 2029.

[H3] Technological Advancements

Increased "life" of freight infrastructure through the development of new materials and maintenance processes.

Threats

Bridges

Although the region saw increases in good and fair bridge conditions, each county reported an increase in their percent of bridges in poor condition between 2014 and 2020. Further degradation of the region's bridge infrastructure could result in reduced weight limits and delays in freight movement resulting from longer alternative routes.

Future Decline in River Freight Volume

Waterborne freight in the OKI region is the only mode forecasted to decrease in volume (8%) between today and 2050. This fall in volume is a trend the region has witnessed over the past several years due to the significant decrease in coal (59%) use in electric generation and subsequent shipping by barge along the Ohio River. Although forecasts for the future value of river freight is expected increase (60%), the drop in volume may impact the level federal attention and funding invested in maintaining the inland waterway network in light of growing volumes and infrastructure demands from other freight modes.

Future Rail Traffic

With nearly 500 miles of freight rail, 786 public and private at-grade crossings, 195 railroad bridges, and about 137 trains traveling in the region daily -- which is forecasted to increase -- maintenance of our rail infrastructure is critical to the safe, efficient, and environmentally sustainable economic competitiveness of this mode. The expected increase in rail traffic possesses a threat to rail safety and efficiency to the railroads in the region.

Mobility and Reliability Strengths, Weaknesses, Opportunities and Threats

Strengths

Few Freight Bottlenecks

Compared to other regions of similar size the OKI region has fewer chokepoints, with the exception of the second national truck freight bottleneck at the Brent Spence Bridge. With the recent announcement of national funding support, it is anticipated that this chokepoint will be eliminated in the next 5 years.

Roadway Connectivity

The OKI region includes good roadway connectivity with local roadway access to/from manufacturers and shippers to a robust interstate highway network for intra- and inter-regional truck mobility.

Rail Freight Hub

The region includes efficient Class I and short line freight rail connections and major Class I freight rail intermodal facilities with the CSX Queensgate Yard being the fifth largest by volume in their network with over 650,000 carloads per year passing through the terminal.

Multimodal Connectivity

With shippers requiring ever more efficient movement of freight to reduce costs while maintaining reliability, the OKI region is well positioned in that it has good multimodal connections including rail, road and pipeline access to inland river port shipping, which currently has excess capacity for expanded river freight activity and modal shift due to the decrease in coal shipments.

Air Cargo Operations

The OKI region is home to the Cincinnati/Northern Kentucky International Airport's (CVG) extensive and growing air express operations with two international air cargo commercial hubs making it the seventh largest air cargo airport by tonnage in North America. The airport also has good connections between air freight and regional manufacturers such as medical supply manufacturing in Indiana.

Weaknesses

Roadway Congestion

It is forecasted that truck vehicle miles will increase over 15% between 2020 and 2050. Congested highways with recurring congestion, result in unreliable journey times for freight movement. In 2021, the Brent Spence Bridge Corridor saw the highest, most unreliable AM and

PM peak truck travel time in the OKI region. Due to necessary improvements to the bridge due to be completed in the future, this bottleneck is expected to alleviate much of the congestion, however forecasts show the most congested truck bottleneck in 2050 will be in the northern portion of the region along I-75 in Warren County.

Older Roadway Design

The geometry of some highway intersections does not meet today's safety standards to efficiently accommodate large trucks; nor will they have the ability to handle forecasted increases in truck traffic volume.

Rail Grade Crossings

The region regularly experiences conflicts between vehicles and freight trains, largely as a result of historic legacies associated with the growth of urban development along rail corridors and, more recently, the railroad's operational shift to longer trains. The presence of railway yards and loading facilities near population centers also creates challenges when trains are marshalled and reconfigured while undergoing loading or discharge operations. Butler County is home to the top three, least-safe, least-redundant, highest-delay, and highest-publicly important rail grade crossings for trucks in the OKI region.

Short Line Railroad Constraints

Short line railroads have infrastructure constraints that prevent them from maximizing the payload associated with 286,000-pound rail cars, which also results in lower operating speeds.

Rail Chokepoints

In addition to rail grade crossings, there are a few rail chokepoints in the region which arise due to limited infrastructure capacity and growing train volumes. The Indiana & Ohio Railway operates within a bottleneck associated with the single, northbound/southbound mainline track that provides the only access into and out of Cincinnati thereby restricting rail movements to one train at a time.

In addition, CSX has indicated that the physical constraints of the Spring Grove Avenue Railroad Bridge delays trains during periods of high peak rail traffic. Two rail tracks to the north and south of the bridge narrow to a single track. To date, CSX has addressed this by implementing operational modifications to circumvent limitations and assist in minimizing train travel time delays.

River Crossings

The Ohio River creates a barrier to north-south travel. This results in the focusing of freight train and truck traffic to a limited number of crossing points. In 2021, the Brent Spence Bridge Corridor saw the highest, most unreliable AM and PM peak truck travel time in the OKI region.

Flooding

Sections of the OKI freight network that are close to rivers and in low-lying areas are susceptible to flooding. This impacts businesses and the ability of freight to move efficiently on roadways, rail and rivers.

Freight-Related Employment

Among other impacts to the movement of freight and the regional economy, the lack of sufficient workforce across all the modes has an impact on reliability of freight movement. Since regional freight-related employment is forecasted to decrease by 2.2% between 2020 and 2050, shippers and carriers may not have the workforce necessary to reliably and efficiently move goods due to the lack of freight handlers, mechanics, drivers/operators, etc.

Opportunities

Federal Funding

Additional opportunities include the availability of discretionary funding grants through the Infrastructure Investment and Jobs Act (IIJA) with specific program merits addressing congestion reduction, system reliability and freight movement.

Railroad Operations Technologies

Several technologies exist that make operations more efficient, assist railroads in streamlining cost and provide more efficient freight movement. These include:

- Dispatching software to help optimize train movement across the network by analyzing train schedules, speed restrictions and crew schedules to develop the best operating plan.
- Customer application program Interfaces to provide rail customers with highly detailed data to support shipment tracking to assist with better operations and inventory management.
- Mobile apps for trucking partners to expedite intermodal movements and minimizing the time spent in rail yards by recognizing and approving drivers and providing receipts and digital paperwork as part of an Automated Gate Systems.
- Minimizing HAZMAT spills through rail maintenance technologies such as automated track inspection (ATI) Technologies; track inspection vehicles; wayside detectors; machine visioning to inspect trains as they move; predictive maintenance based on patterns and trends found through sensors across the network.

Passenger Rail

There has been a recent interest in expanding intercity passenger rail service throughout Ohio and the country. Since these trains operate on rail lines owned by freight rail companies, the capacity required for the faster moving passenger trains provides an opportunity for railroads to make desirable mobility and reliability improvements that not only maintain existing freight rail speeds and volumes but may assist in enhancing delivery efficiency.

Air Cargo Technologies

Technology is swiftly advancing to introduce air cargo transport vehicles that do not require a runway for take offs and landings. Rather, future air deliveries will utilize landing pads for vertical operations and distribution facilities with direct connections to and from road freight vehicles, a.k.a. trucks, of all shapes and sizes. With the adoption of new technology, all of region's public airports may witness increased opportunities for handling air cargo by 2050 through playing a key role in last mile parcel delivery to local residents and businesses.

Threats

Roadway Congestion

The interstates and main freight corridors in the region primarily traverse urban areas. As urbanized populations continue to grow, trucks and passenger vehicle volume is forecasted to increase, leading to an increase in congestion on interstates and reduction in the reliability of freight movement.

Rail Crossings Closures

Though removing at grade rail crossings would increase safety, if there are no reasonable alternatives for roadway vehicles, there could be negative impacts on roadway connectivity. Railroads would like to eliminate as many at grade crossings as possible, while doing so could potentially impact traffic flow to roads within local communities. The balance between rail freight movement and roadway mobility continues to be a challenge and is expected to remain one for the foreseeable future.

River Shipping Constraints

The Captain Anthony Meldahl Locks and Dam is the only lock and dam in the OKI region; however, due to the long distances needed to realize the efficiency of river shipping, barge capacity limitations along Mississippi and Ohio River lock and dam network have a significant impact on river freight movement. Larger barge tows must be taken apart to fit the locks, then reassembled to resume river transport once all units have navigated through the system.

In addition, in recent years there has been reduced reliability of region's connectivity to global markets via U.S. inland waterway network, due to extreme weather conditions (e.g.: drought conditions causing low water levels on Mississippi River).

Environmental Sustainability Strengths, Weaknesses, Opportunities and Threats

Strengths

Alternative Fuels for Freight Vehicles

Today greater importance is placed on strategies that promote effective and efficient use of natural resources that reduce adverse environmental and community impacts. Decreasing mobile source emissions, noise pollution, and non-renewable fuel usage exemplify approaches that have a beneficial effect on the region's quality of life and that promote a more sustainable future.

The U.S. Department of Transportation's (DOT) National Electric Vehicle Infrastructure (NEVI) Formula Program requires states to submit an annual EV Infrastructure Deployment Plan (Plan) to the DOT and U.S. Department of Energy (DOE) Joint Office of Energy and Transportation, describing how the state intends to distribute NEVI funds.

In addition, the Ohio Environmental Protection Agency (Ohio EPA) offers grants for the replacement or repower of eligible vehicles and equipment, which includes Class 4-8 trucks. Other eligible freight uses include airport ground support equipment, forklifts, port cargo handling equipment, and freight-switcher locomotives, and alternative fuel infrastructure if a site assessment is conducted. (Source: Ohio Revised Code 122.861)

Access to High Tech Industries

CVG is the seventh largest air cargo airport by tonnage in the US. The airport has good connections to an interstate system that allows its reach to go far beyond the OKI region. Due to the time sensitive nature of air cargo, the region is well positioned to efficiently move freight to high-tech industries. This includes the Intel semiconductor manufacturing facility near Columbus, Ohio, which is expected to open in 2026.

Pipeline Safety

Considering the region's excellent safety record for significantly reducing pipeline spills the past twenty years, as well as advances in pipeline technology, industry analysts say that our pipeline network will help make freight transportation more environmentally sustainable and resilient.

Weaknesses

Pollution

Under provisions of the Clean Air Act Amendment (CAA), the U.S. Environmental Protection Agency (EPA) redesignated OKI's Ohio counties as being in attainment for ozone under the new 2022 ozone standard. Northern Kentucky is in moderate nonattainment. Nonattainment means that the area is not meeting the national ambient air quality standard. Ozone is formed through

photochemical reactions created when sunlight reacts with volatile organic compounds, or VOCs, and oxides of nitrogen (NOx). VOCs and NOx occur from incomplete combustion of fossil fuels.

It is estimated that trucks contribute about 66% NOx and 75% PM2.5 of the region’s 2019 total on-road mobile emissions. The greatest source of truck emissions does not come from delay or congestion, but rather from the high number of vehicle miles trucks travel in, out, within, and through the OKI region.

Opportunities

Electrified or Alternative Fuel Truck Corridors

Short haul and consistent truck movements provide regional opportunities for increasing efficiency and environmental sustainability of freight movement. In 2050, the area encompassing CVG is forecasted to have the highest number or concentration of average daily total truck trip origins and destinations. Further analysis performed as part of this freight plan revealed specific corridors whose truck movements create potential corridors for truck electrification due their predictability, repetitiveness and short distances.

Table 1: Roadways Exhibiting Greatest Potential as Electrified or Alternative Fuel Truck Corridors Serving CVG

| Facility Name | General Location | County | Type of Businesses |
|---------------|---|-----------------|--|
| KY 16, I-275 | KY 16 in Latonia | Kenton | Fuel Storage and Transport |
| I-71 | SR 123 to Warren County Line | Warren | Farm Production and Agriculture |
| I-75 | Around SR 123 interchange to Warren County Line | Warren | Machine Manufacturing |
| I-71/I-75 | Around the I-71 and I-75 Split | Boone, Kenton | Metal, Steel, and Machine Manufacturing |
| I-74, I-275 | I-74 from the Dearborn County Line to SR 1 | Dearborn, Boone | Wholesalers, Auto Repair Shops, Farm Equipment Suppliers |

Source: American Transportation Research Institute (ATRI). (2021-2022). [Data set].

Alt Text: Table includes four columns for Facility Name, and Origin/Destination by General Location, County, and Type of Business. Five rows include the data values for these four columns for roadways showing opportunity as alternative fuel truck corridors serving CVG.

Connected and Autonomous Trucks

Connected and autonomous trucks could have opportunities in the region. Such technology is expected to first take a foothold in through traffic rather than freight vehicles that have an origin or destination in the region. Automation tends to favor less complex roads with minimum access points, so any activity is likely to occur on interstates first. The result to the region would

be fewer emissions due to the efficiencies and fuel savings resulting from the use of the technology, as well as enhanced safety from the removal of driver error.

Quiet Zones

The number of rail quiet zones in the region may be able to be increased, depending on funding and meeting appropriate safety criteria.

Noise Pollution Reduction through New Technologies

Improvements to quality of life through the decline in freight-related noise pollution from the introduction of new technologies and policies.

Low/Zero Emission Locomotives

All railroads are slowly replacing older locomotives with newer, more efficient ones. Railroads are exploring up to 100% renewable diesel and biodiesel in existing locomotives, which could quickly and dramatically reduce carbon emissions by 20 to 25%. Future lower and zero-emission technologies include hybrid, hydrogen fuel cell, and electric locomotives.

Expanding Funding Opportunities

Additional opportunities include the availability of discretionary funding grants through the Infrastructure Investment and Jobs Act (IIJA) with specific program merits addressing environmental sustainability and resiliency; historically disadvantaged or underserved communities; and equity and community connectivity.

Impact to Disadvantaged Communities

The freight road, rail, river, runway, and pipeline networks we rely on to move goods are significant sources of noise and atmospheric pollution. These networks are often located in areas of lower real estate value due to their associated, unavoidable negative impacts. Over time, many residents and business owners in these areas have been disproportionately impacted by the adverse economic and/or environmental effects of freight and other traffic.

To address this disparity, the Biden administration has instituted a policy -- the Justice40 Initiative. This policy provides investments in these communities, with the goal to create better environmental and economic conditions by reducing adverse environmental threats and creating employment opportunities. The Justice40 Initiative’s focus is to provide these benefits across eight categories for these disadvantaged communities.

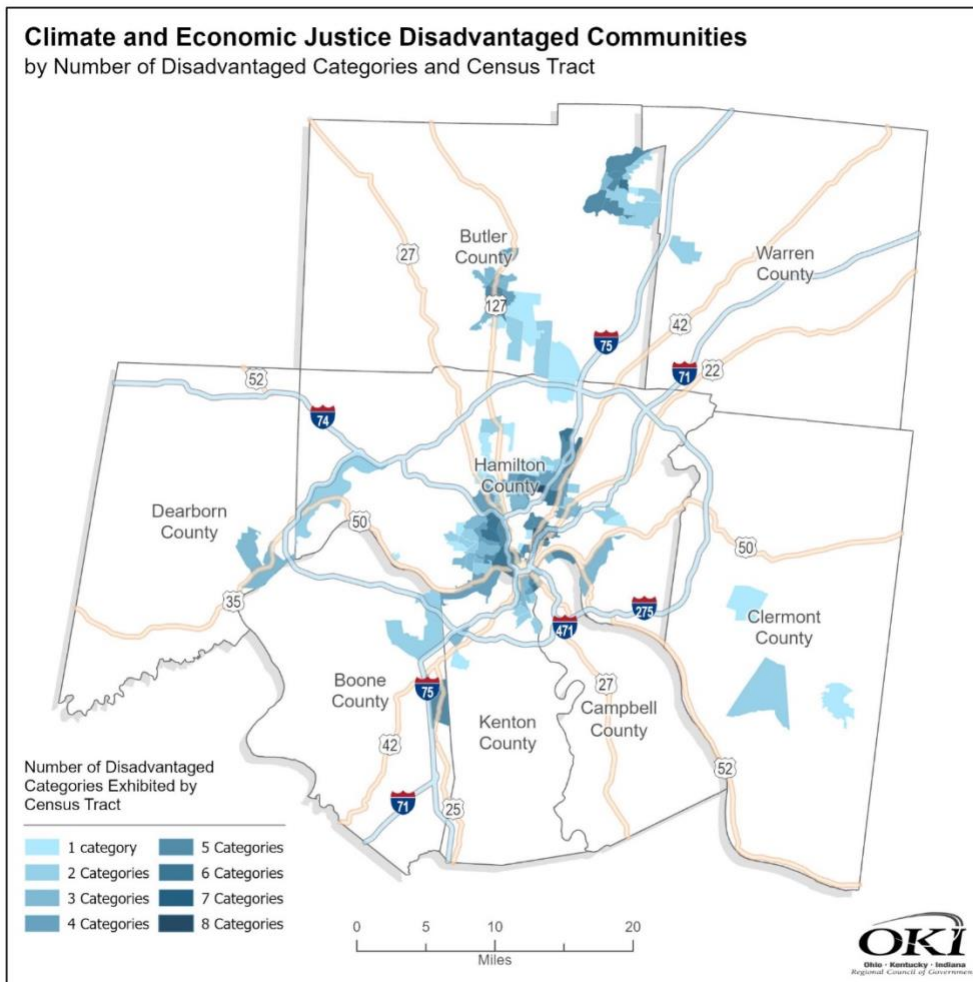
Table 2: Percent of Regional Population Meeting Climate and Economic Justice Disadvantaged Category Criteria

| Disadvantaged Categories | Communities are identified as disadvantaged if they are in census tracts that: | Percent of Total OKI Regional Population | Number of People |
|--------------------------|---|--|------------------|
| Health | ARE at or above the 90th percentile for asthma OR diabetes OR heart disease OR low life expectancy AND are at or above the 65th percentile for low income | 14.30% | 295,401 |

| | | | |
|-----------------------|--|--------|---------|
| Housing | Experienced historic underinvestment OR are at or above the 90th percentile for the housing cost OR lack of green space OR lack of indoor plumbing OR lead paint AND are at or above the 65th percentile for low income. | 13.91% | 287,409 |
| Workforce Development | ARE at or above the 90th percentile for linguistic isolation OR low median income OR poverty OR unemployment AND fewer than 10% of people ages 25 or older have a high school education (i.e. graduated with a high school diploma). | 9.94% | 205,428 |
| Legacy pollution | Have at least one abandoned mine land OR Formerly Used Defense Sites OR are at or above the 90th percentile for proximity to hazardous waste facilities OR proximity to Superfund sites (National Priorities List (NPL)) OR proximity to Risk Management Plan (RMP) facilities AND are at or above the 65th percentile for low income. | 9.15% | 188,965 |
| Transportation | ARE at or above the 90th percentile for diesel particulate matter exposure OR transportation barriers OR traffic proximity and volume AND are at or above the 65th percentile for low income. | 6.18% | 127,627 |
| Water and Wastewater | ARE at or above the 90th percentile for underground storage tanks and releases OR wastewater discharge AND are at or above the 65th percentile for low income. | 3.27% | 67,561 |
| Energy | ARE at or above the 90th percentile for energy cost OR PM2.5 in the air AND are at or above the 65th percentile for low income. | 2.95% | 60,872 |
| Climate Change | ARE at or above the 90th percentile for expected agriculture loss rate OR expected building loss rate OR expected population loss rate OR projected flood risk OR projected wildfire risk AND are at or above the 65th percentile for low income | 1.18% | 24,476 |

Source: Executive Office of the President of the United States. Council on Environmental Quality (CEQ). November 11, 2022.

The map below identifies Census Tracts in the OKI region that meet one or more of the Justice40 Initiative category criteria. Of the region’s total 2,065,843 population, one in five people live in an area that meets at least one Justice40 category.



Source: Executive Office of the President of the United States. Council on Environmental Quality (CEQ). November 11, 2022.

Caption: Figure 2: Map Identifying Census Tracts in the OKI Region by Number of Justice40 Initiative Categories

The map uses a range of light to dark blue colors to highlight the Census Tracts in the OKI region that meet one to all eight of the Justice40 Disadvantaged category criteria.

Source: Executive Office of the President of the United States. Council on Environmental Quality (CEQ). November 11, 2022.

Prior to the Biden Administration's establishment of the Justice40 Initiative, the Trump Administration created the designation of Opportunity Zones under the 2017 Tax Cuts and Jobs Act (TCJA).

Opportunity Zones comprise 8,764 census tracts which were nominated by State and Territorial executives and certified by the U.S. Department of the Treasury. The Opportunity Zones tax incentive is designed to spur economic development and job creation in these communities through preferential tax treatment for those investing certain eligible capital gains into Opportunity Zones through Qualified Opportunity Funds. In addition, many federal grant programs award priority to projects located within [Opportunity Zone-designated census tracts](#).

Threats

Removal or Reduction of Decarbonization Public Support

The push for decarbonization and more environmentally friendly freight operations is supported by national, state, and local policies and funding initiatives. The largest threat to achieving regional sustainability goals is the removal of public support. A roll back of some or all environmental initiatives would make it both more difficult and costly to implement carbon neutral freight options.

Freight Volume Growth

The freight volume growth forecasted for all freight modes (except water) in the OKI region may adversely affect disadvantaged communities economically and/or environmentally. This could happen through potential increases in noise and atmospheric pollution.

Economic Competitiveness Strengths, Weaknesses, Opportunities and Threats

Strengths

Regional Population Growth

Between 2015 and 2050, the combined population of all eight counties is expected to grow by 11%, from 2 million to 2.3 million. Most growth will take place in the next decade, with the region growing 6% between 2015 and 2030. A growing population will generate greater demand for goods overall. But it will especially increase demand for e-commerce goods. E-commerce attracts companies (such as Amazon) to locate warehouses near CVG for centralized access to our population.

Future Potential of the Region's Eight Public Airports

Combining the forecast for e-commerce growth with advancements in air cargo technology and the availability of eight public airports, the OKI region is primed to take advantage of small uncrewed aerial vehicles (sUAVs) and vertical take-off and landing (VTOL) transport technology through development of cargo vertiports.

Freight Multi-Modal Accessibility

Key regional industry sectors such as construction and manufacturing have good access to the river, rail and pipeline networks. This is one of the key considerations for existing businesses to stay and new employers to locate in the region.

Weaknesses

Forecasted Declines in Freight Employment

Freight-related employment is considered those jobs in sectors that are heavily reliant on the movement of goods. These sectors include:

- Agriculture, forestry, fishing and hunting
- Mining/utilities/construction
- Manufacturing
- Wholesale trade
- Retail trade
- Transportation and warehousing

Freight employment in the entire OKI region is expected to decrease by 2.2% between 2020 and 2050. Warren County shows the greatest decline at 9.7%, followed by Hamilton (4.9%) and Butler (4.2%).

Freight stakeholders have indicated they are experiencing shortages in workers due to competition with other occupations, ones less physically demanding and with more flexible

work schedules. Given the increases forecasted for freight volumes throughout the region -- and the decrease in number of workers in freight occupations -- this concerning nexus could have a significant impact on the economic competitiveness of the region.

Table 3: Freight Employment Forecasts by OKI County, 2020 and 2050

| County | Freight Employment (2020) | Freight Employment (2050) | Percent Change |
|------------|---------------------------|---------------------------|----------------|
| OKI Region | 345,706 | 338,035 | -2.2% |
| Boone | 46,154 | 47,353 | 2.6% |
| Butler | 65,483 | 62,790 | -4.1% |
| Campbell | 10,111 | 11,441 | 13.2% |
| Clermont | 23,676 | 24,056 | 1.6% |
| Dearborn | 5,522 | 5,909 | 7.0% |
| Hamilton | 147,033 | 139,849 | -4.9% |
| Kenton | 17,235 | 19,097 | 10.8% |
| Warren | 30,492 | 27,540 | -9.7% |

Source: The Ohio-Kentucky-Indiana Regional Council of Governments (OKI). OKI Employment Projections. (2017).

Limited River Freight Property

Although there are over a hundred miles of riverfront in the OKI region, there is competition among different land uses that limits what is available for freight movement. In addition, being a metropolitan area, few undeveloped sites of significant acreage exist. These limitations combine to make it difficult to expand the river shipping network.

Opportunities

River Capacity

The OKI region is fortunate to have access to all freight modes of transportation. Much of the roadway and rail freight network is at near capacity; however, there is excess capacity for moving freight on the Ohio River. Commodity mode shifts (such as containers-on- barge) can help reduce road and rail congestion, as well as lower the cost of moving goods via a more cost effective (\$/ton-mile), non-time sensitive mode.

Federal Freight Funding

Additional opportunities include the availability of discretionary funding grants through the Infrastructure Investment and Jobs Act (IIJA), with specific program merits addressing Economic Vitality. The freight programs within the law include:

- **National Highway Freight Program (NHFP):** Includes new freight planning policy, a new National Highway Freight Network (NHFN), and new formula funding for freight projects.

To be eligible for NHFP funds, freight projects must contribute to the efficient movement on freight on the NHFN and be identified in State freight plans.

- **Multimodal Projects Discretionary Grant Program (MPDG):** Allows the use of one application to apply for up to three separate USDOT funding opportunities: MEGA, INFRA, and Rural Surface Transportation Grant.
- **MEGA Grant Program:** Program is aimed to support large, complex projects that are difficult to fund by other means and likely to generate national or regional economic, mobility, or safety benefits.
- **Infrastructure for Rebuilding America Grants (INFRA):** Financial assistance to nationally and regionally significant freight and highway projects that align with the program goals of safety, efficiency, and reliability of the movement of freight and people, generating national or regional economic benefits, improving connectivity between modes of freight transportation, and addressing the impact of population growth on the movement of people and freight.
- **Rural Surface Transportation Grant Program (RURAL):** Supports projects to improve and expand the surface transportation infrastructure in rural areas to increase connectivity, improve the safety and reliability of the movement of people and freight, and generate regional economic growth and improve quality of life.
- **Rebuilding American Infrastructure with Sustainability and Equity Program (RAISE):** Provides funds for investment in road, rail, transit, and port projects that promise to achieve national objectives.
- **National Highway Performance Program:** Provides funding related to the condition and performance of the Interstate System and NHS.
- **Surface Transportation Program Block Grant Program (STBG):** Provides flexible funding for projects on any federal-aid highway, on bridges on any public roads, and on bridge and tunnel inspection and inspector training. Eligible freight projects also include bridge clearance increases to accommodate double-stack freight trains, capital costs of advanced truck stop electrification systems, freight transfer yards, and truck parking facilities.
- **Congestion Mitigation and Air Quality Program (CMAQ):** A flexible funding transportation improvement program to support transportation projects that reduce mobile source emissions in areas designated by the US EPA.
- **Diesel Emissions Reductions Act (DERA):** Program is to achieve significant reductions in diesel emissions and exposure, particularly from fleets operating in areas designated by the Administrator as poor air quality areas.
- **Highway Safety Improvement Program:** Supports projects that improve the safety of road infrastructure. These projects could add capacity; improve alignment or operations, such as intersections and curves; or make road improvements, such as signing, pavement markings, or adding rumble strips.
- **Motor Carrier Safety Assistance Program (MCSAP):** Funds projects to improve driver safety and reduce the number and severity of crashes, injuries and fatalities involving commercial motor vehicles.
- **High Priority Grant Program:** Designed to provide federal financial assistance to new project(s) that will have a positive impact on CMV safety.

- **The Transportation Infrastructure Finance and Innovation Act (TIFIA):** Provides federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance.
- **Consolidated Rail Infrastructure and Safety Improvements Program (CRISI):** Funds Capital Project development and implementation under the FRA to improve the safety, efficiency, and reliability of intercity passenger and freight railroads.
- **Railway-Highways Crossing Program:** Program provides funds for the elimination of hazards at railway-highway crossings.
- **Railroad Crossing Elimination Program (RCE):** Provides funding for highway-rail or pathway-rail grade crossing improvement projects that focus on improving the safety and mobility of people and goods.

Threats

Modal Competition

In the future, VTOLs will open the door for opportunities outside of large commercial airports. Using this technology at typically non-commercial facilities or to replace aircraft feeder services could potentially reduce some air cargo activity and associated revenue at conventional airport facilities.

The trucking industry wants to change the regulations on the size and weight restrictions of freight moving on the region's roadways. Heavier and longer loads would make some shipments of heavier bulk goods more feasible on trucks versus freight rail. The shift of more freight to trucks would add to roadway congestion and potentially weaken the region's competitive edge, creating less reliable travel times and more bottlenecks.

Although hyperloop systems are still far from real-world deployment and not expected to occur by 2050, they are being designed and tested to move cargo at air travel speeds and reduced costs. Hyperloop's potential benefit would be in its ability to move relatively small cargo loads over great distances, and with great time savings. With this aim and in direct competition with air cargo, hyperloop could potentially connect Cincinnati to major metropolitan areas such as Chicago, New York and Atlanta.

Labor Shortages

For the OKI region, freight employment is expected to decrease by 2.2% between 2020 and 2050. Freight stakeholders have indicated that they are experiencing shortages. With an expected increase in freight throughout the region and the decrease in number of workers in freight occupations, this trend could have a negative effect on the region. A shortage of labor within freight sectors affects the cost, flexibility and responsiveness of freight services to, from and within the region. With increasing demand for goods, more workers will be required to move raw materials and finished goods to producers, distributors and consumers.

Transitioning Global Energy Market

A global energy market that is in transition could create threats to the international freight transportation system, ranging from a reduced tax base to reduced investment in infrastructure. As seen during the COVID pandemic, supply chains are streamlined and susceptible to disruptions. Energy prices directly influence the cost of transporting goods to, from and within the OKI region.