

## 6.0 Impacts of Freight Rail Transportation in Ohio

The impacts of freight rail services to the overall conditions of Ohio, Ohio business and industry, and the quality of life of Ohioans are extensive and diverse. This chapter discusses freight rail impacts to Ohio’s economy, environment, energy, land use, community character, and quality of life.

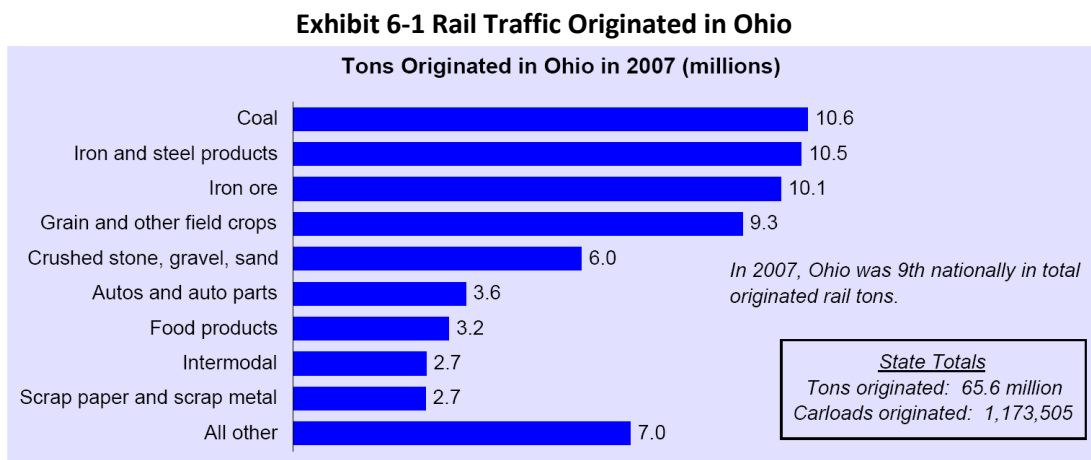
### 6.1 Economics

Economic development can be defined as establishing a sustainable enhancement to the economic activity for a given region. Transportation investments can enhance economic development by providing enhanced access to existing businesses, and by improving access and mobility to attract new business. While transportation is not the only consideration in establishing the site for a new business, an efficient transportation system can greatly reduce business costs, open up new markets and improve competitiveness for businesses. Rail transportation has provided a vital role in establishing Ohio’s economic base.

Manufacturing, agriculture, and the coal industries have long been the foundation of Ohio’s economy. To successfully support a manufacturing economy, strong transportation links are required. Efficient and reliable transportation links are critical to getting raw material into the state, and manufactured products out of state. Rail has been a critical link supporting manufacturing in Ohio.

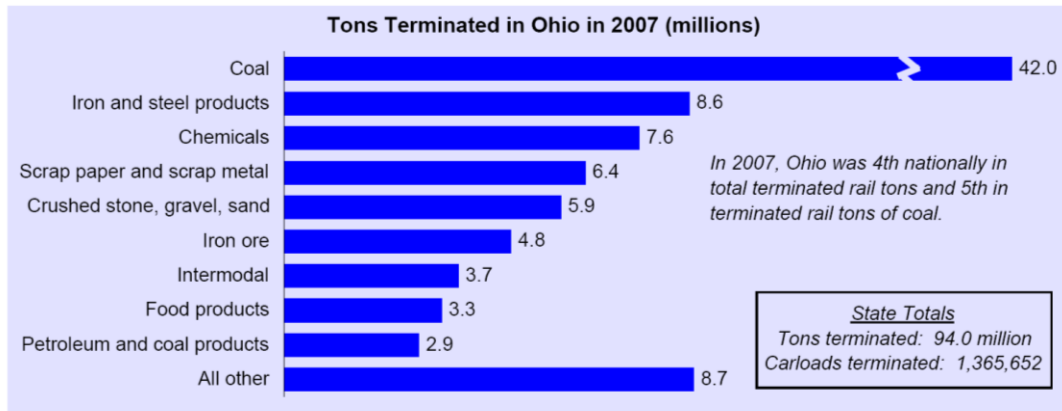
In addition to manufacturing, Ohio’s freight rail system also supports the agriculture and coal industries. Both Class I and short line railroads combine to support Ohio’s agricultural and coal industries. Without this access to the low cost, high volume transportation provided by the rail system, farmers and coal suppliers would find it difficult to compete in their respective markets.

**Exhibit 6-1** and **Exhibit 6-2** show the diversity of freight transported by all railroad classes based on the Surface Transportation Board’s 2007 Waybill Sample.



Source: Association of American Railroads State Profiles website

**Exhibit 6-2 Rail Traffic Terminated in Ohio**



Source: Association of American Railroads State Profiles website

Shift of this traffic to more costly motor carrier transportation would increase supply chain cost, which would be either passed on to the consumer or absorbed by the industry, reducing its ability to expand. Were the increase in transportation costs significant enough, industries would relocate or completely cease operations.

The rail industry itself directly contributes to the state’s employment base. According to the Association of American Railroad’s 2007 statistics, freight railroads (all Classes) employed 7,983 employees in the state of Ohio, with an average salary of \$64,000 before fringe benefits. In addition to the Ohio employment at Ohio railroads, Ohio supports a vibrant rail contractor and rail supplier industry. A recent survey of Ohio businesses performed by ORDC and ODOT identified at least 225 Ohio businesses which supply or contract with the railroad industry. These 225 businesses employ over 26,000 people.

## 6.2 Environment

Freight rail transportation impacts Ohio’s environmental conditions both positively and negatively. Diesel locomotives produce both air and noise pollution; the occasional derailment can result in spillage of environmentally damaging product. Under normal operating conditions, rail freight, like any other mode of transportation, can have adverse impacts on the environment. Rail-related impacts, however, compare very favorably to air quality and noise impacts of comparable movements by trucks. According to the Association of American Railroads, railroads, on average, are three or more times more fuel efficient than trucks on a ton-mile transported basis.

The United States Congress and Administration are looking at numerous opportunities to address green house gas emissions. With cap and trade legislation and reauthorization of the surface transportation bill under discussion, the impact of carbon emissions is quickly becoming a serious consideration in the movement of freight.

According to 2006 Environmental Protection Agency data, as shown in **Exhibit 6-3**, total US greenhouse gas emissions were 7,054 teragrams of carbon dioxide equivalents, with transportation accounting for 28 percent. Of the transportation sector’s greenhouse gas emissions, trucking accounted for 20.8 percent, while freight railroads produced only 2.6 percent. By comparison trucks and rail move comparable ton-miles.

**Exhibit 6-3 Greenhouse Emissions by Industry Sector**

U.S. Greenhouse Gas Emissions By Economic Sector: 2006			U.S. Greenhouse Gas Emissions from Transportation: 2006		
Economic Sector	Tg CO2 Eq.	% of Total	Economic Sector	Tg CO2 Eq.	% of Total
Electr. generation	2,377.8	33.7%	Trucking	404.6	20.8%
Residential	344.8	4.9%	<b>Freight Railroads</b>	<b>51.5</b>	2.6%
Industry	1,371.5	19.4%	Waterborne Freight	30.2	1.5%
Agriculture	533.6	7.6%	Pipelines	32.4	1.7%
Transportation	1,969.5	27.9%	Aircraft	157.4	8.1%
Commercial	394.6	5.6%	Recreational Boats	17.4	0.9%
U.S. Territories	62.4	0.9%	Passenger Railroads	6.4	0.3%
<b>Total</b>	<b>7,054.2</b>	<b>100.0%</b>	Pass. Cars & Light Duty Trucks	1,236.9	63.5%
			Buses	12.5	0.6%
			<b>Total</b>	<b>1,949.3</b>	<b>100.0%</b>

Data are in teragrams of CO2 equivalents.

Source: EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006, Tables ES-7, A-100, and A-101.*  
Totals for "transportation" in the two tables do not match exactly because of estimation issues.

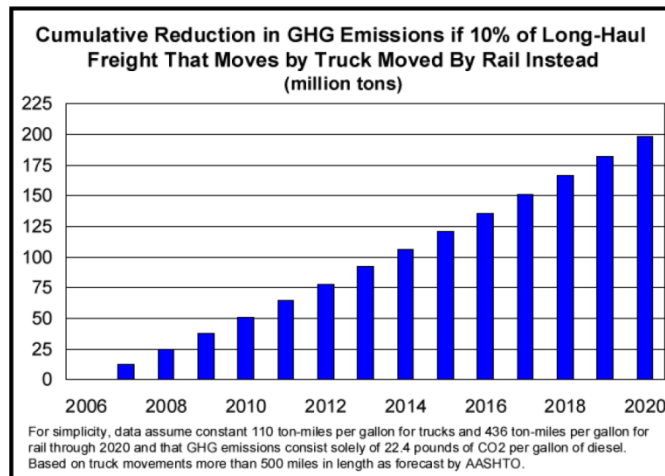
The EPA has established the SmartWay Transport Partnership to help companies calculate emissions associated with product transport. All Class I railroads operating in the US participate in SmartWay.

Emissions from highway vehicle product transport include those from gasoline or diesel and are based on fuel usage, vehicle mileage, and vehicle/control technology. Emissions from rail product transport are primarily due to diesel freight systems and are based on fuel usage.

Freight railroads are reducing greenhouse gas emission through the use of Green Rail Yard technology. A green rail yard is defined as any facility at a rail system node that has applied leading edge technology to minimize environmental effects. Examples of this technology include the use of low- or no- emission mobile equipment, such as container lift cranes; onsite renewable energy generation (solar, wind, etc.) to provide all or part of the yard’s power consumption; and the use of gen-set or hybrid locomotives.

Because freight transportation is expected to rise sharply, future greenhouse gas reductions are expected to increase. For example, AASHTO projects that ton-miles for truck movements more than 500 miles long will increase from 1.4 trillion in 2000 to 2.14 trillion in 2020. If 10 percent of this freight were diverted from trucks to trains (perhaps using efficient intermodal movements as well as increased access to direct carload service) cumulative estimated greenhouse gas reductions from 2007 through 2020 could be as much as 200 million tons, as illustrated in **Exhibit 6-4**.

**Exhibit 6-4 Reduction in Greenhouse Gas Emissions**



Source: Association of American Railroads report, “Freight Railroads and Greenhouse Gas Emissions,” 2008

The Environmental Protection Agency has adopted a comprehensive national program to reduce emissions from non-road diesel engines, known as Clean Air Non-Road Diesel Rule. This program includes railroad locomotives used for local yard switching operations, as well as long-haul, heavy load operations. The rail industry has endorsed these stringent new locomotive emissions standards that are aimed to cut particulate emissions by up to 90 percent and nitrogen oxide emissions by up to 80 percent.

Major emissions from locomotive diesel engines are nitrogen oxides (NOx) and particulate matter (PM). The EPA, which published its first set of locomotive emissions regulations in 1998, has continued to work toward continued reductions in emissions. Taking advantage of emission control technology already implemented in highway trucks and buses, the EPA, locomotive manufacturers and the rail industry are expected to integrate engine and fuel controls to gain the greatest emission reductions.

US emission standards for railroad locomotives apply to newly manufactured and remanufactured railroad locomotives and locomotive engines. These standards have been adopted by the EPA in two regulatory actions.

The first emissions regulations for railroad locomotives were established in December 1997 and published in 1998. These regulations established tiers, based on when locomotives were manufactured, to guide the industry. Tier 0 standards were established for locomotives originally manufactured between 1973 and 2001. Tier 1 standards addressed new locomotives manufactured in 2002 through 2004. Tier 2 standards were established for new locomotives manufactured in 2005 and later. The Tier 0 and 1 standards were intended to reduce NOx emissions by 33 percent and 50 percent respectively, while preventing increases in other emissions such as PM. Tier 2 standards reduced NOx by 67 percent from pre-control levels and reduced PM by 50 percent.

In March 2008 the EPA introduced new regulations with more stringent emission requirements. Tier 3 standards, to be met by engine design methods, become effective for locomotives manufactured in 2012. These standards maintain Tier 2 NOx standards while reducing PM emissions an additional 50 percent. Tier 4 standards, which are expected to require after-treatment technologies, become effective in 2015. Tier 4 standards require a 90 percent reduction in NOx and a 93 percent reduction in PM from uncontrolled levels.

These regulations include new idle reduction requirements for newly built and remanufactured locomotives and adopt provisions to encourage a new generation of clean switcher locomotives based on clean, non-road diesel

engine standards. The rule is designed to cut emissions from all types of diesel locomotives including linehaul, switcher, and passenger rail.

By 2030, this program is designed to reduce annual emissions of NOx nationally by about 800,000 tons and PM emissions by 27,000 tons; those emission reductions are expected to continue to increase beyond 2030 as fleet turnover largely is completed.

As noted in the statistics provided by EPA in Exhibit 6-3 and AAR in Exhibit 6-4, the railroads serving Ohio already contribute to improved air quality and have the potential to contribute further through a decrease in highway vehicle miles traveled and vehicle emissions (both carbon and greenhouse gas).

### 6.3 Land Use

Land use planning authority in Ohio resides with local governments. As with many states, the Ohio Department of Transportation is charged with providing a transportation system that effectively serves the transportation needs of the communities, businesses, industries, and citizens. The coordination of both land use planning and transportation planning is necessary to providing an efficient and effective coordinated system.

Because of noise and air pollution, few people want to live near rail lines or rail yards. Local zoning ordinances and land use decisions tend to favor residential or commercial development in many urban areas. Thus, in Ohio's urban areas, particularly within the Cleveland, Akron, Columbus, Toledo, Dayton, and Cincinnati areas, available land is scarce for any freight rail expansion. Many existing yards and facilities are small, obsolete or located in remote or inaccessible locations. Highway access to intermodal yards is also often limited to narrow roadways with low clearances or geometrics difficult for trucks to negotiate.

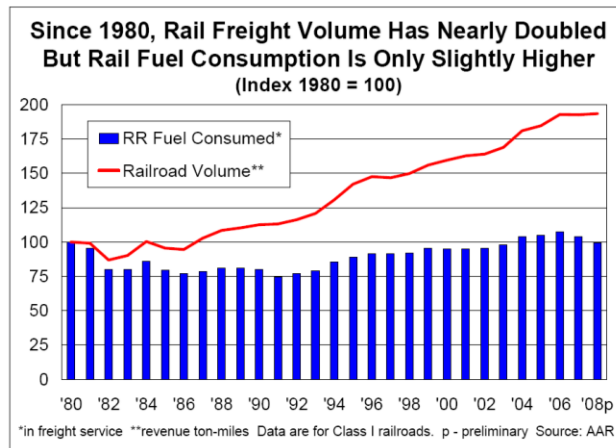
Most rail yard expansion is now taking place in suburban areas. In the suburban Columbus area, Norfolk Southern built the Rickenbacker Intermodal Facility. In the Toledo area, CSX built a new intermodal yard near N. Baltimore. The difference in the suburban and rural areas is that there is more available land for expansion. This trend is also based on the reality that high volume rail operations in center city areas can create congestion and safety concerns at grade crossings, separate neighborhoods, and use property for yard operations that could be utilized for more valuable development purposes.

These land use decisions, however, must be balanced with their impact on the rail industry's ability to meet increasing freight demand in urban areas, and ultimately could lead to freight access in urban areas being limited to trucks only.

### 6.4 Energy

Freight railroads are the most energy efficient choice for moving goods. Nationally, in 2007 one gallon of fuel moved one ton of freight by rail 436 miles – roughly the round trip distance between Cleveland and Cincinnati. Moving more freight by rail is a straight-forward way to meaningfully reduce both energy use and greenhouse gas emissions without harming the economy. Based on data from the American Association of State Highway and Transportation Officials, if one percent of long-haul freight currently moved by truck were moved by rail instead, fuel savings would be approximately 111 million gallons per year. Moving more freight by rail would also help cut highway congestion by taking trucks off the road, especially along key corridors. A single intermodal train can take up to 280 trucks off the highways. Depending on cargo, other trains can take up to 500 trucks off highways. The chart below depicts the increased efficiency in rail fuel consumption since 1980.

**Exhibit 6-5 Rail Fuel Consumption**



Source: Association of American Railroads

The rail modes fuel efficiency superiority over other surface transportation modes is primarily based on the fact that it can move long and heavy loads over steel rails which result in much lower friction, and the resulting loss of energy, than trucks' rubber tires on pavement. Also contributing to their efficiency is trains normally run at steady-state speeds, with limited inefficiency due to acceleration, and low driven wheel traction loading.

The Association of American Railroads, in their publication "Freight Railroads & Greenhouse Gas Emissions, July 2007," also notes that railroads are curbing fuel consumption through the use of technology, training of personnel and changes in operating practices. A summary of these initiatives is described below:

- **Locomotives:** Railroads, nationally, have spent billions of dollars on thousands of new environmentally friendly locomotives and have overhauled thousands of older locomotives to improve their environmental friendliness. For example, some new switching locomotives that are used to assemble and disassemble trains in rail yards are "GenSet" (generator set) switchers that sharply reduce fuel consumption and emissions. GenSets have two or three independent engines that cycle on and off, depending on need. Other new switching locomotives are hybrids with a small, fossil-fueled engine in addition to a large bank of rechargeable batteries. Hybrid switchers can save up to half the fuel of conventional switchers while releasing a fraction of smog inducing emissions.
- **Locomotive Monitoring Systems:** Railroads use sophisticated onboard monitoring systems to gather and evaluate information on location, topography, track curvature, train length, and weight; they provide engineers with real-time coaching on the optimum speed for that train from a fuel savings and operational standpoint.
- **Training:** In many cases, railroad fuel efficiency is directly related to how well an engineer handles a train. In effect, railroads use the skills of their engineers to save fuel by offering training programs through which engineers and simulators provide fuel-saving tips.
- **Information technology:** Railroads use advanced computer software to improve their operational efficiency and, therefore, their fuel efficiency. For example, railroads use sophisticated modeling software to identify the best ways to sequence cars in a large classification yard. The result is more efficient yard operation.
- **Innovative trip planning systems:** Railroads also use trip planning systems that automatically analyze a mix of ever-changing variables (e.g., crew and locomotive availability, congestion in rail yards, the priority of different freight cars, track conditions, etc.) to optimize how and when freight cars are

assembled to form trains and when those trains depart. The result is smoother traffic flow, better asset utilization, and reduced fuel use.

- **Reduced idling:** Locomotives often have to idle when not in use for various reasons, such as preventing freezing of the coolant (most lack antifreeze), charging batteries and air reservoirs, and providing for crew comfort. However, some railroads are implementing stop-start idling-reduction technology that allows main engines to shut down when ambient conditions are favorable. One advantage of GenSet locomotives is their smaller engines use antifreeze, thus allowing them to shut down in cold weather. Some railroads also use auxiliary power units that warm engines so that locomotives can be shut down in cold weather.
- **Components and design:** Railroads use innovative freight car and locomotive components and designs to save fuel. For example, advanced top-of-rail lubrication techniques save fuel by reducing friction and wear. Also, improving the aerodynamic profile of trains saves fuel by reducing drag.

Many of these innovations and practices are being explored and/or practiced nationally and locally by railroads operating in Ohio.

### 6.5 Community and Quality of Life Impacts

Community and quality of life impacts related to rail transportation include safety, security, noise and air pollution, and energy. Environmental and energy contributions have been discussed earlier in this chapter. Safety and security issues are addressed in **Chapter 7**.

One additional community impact which has been the subject of recent attention is noise pollution related to railroad operations. This is primarily in the form of locomotive horns, which by law must be utilized as trains approach at-grade crossings as means to warn motorists and pedestrians.

The Federal Railroad Administration has provided localities nationwide with the opportunity to establish quiet zones at these crossing locations. A quiet zone is a grade crossing at which trains are prohibited sounding their horns in order to decrease the noise level for nearby residential communities. Communities wishing to establish quiet zones must equip proposed grade crossings with adequate safety measures to overcome the decrease in safety created by silencing the train horns. The additional safety measures must be constructed at the community's expense and must meet federal specifications.

Rail service in Ohio improves the quality of life in Ohio in various ways. It removes trucks from already congested roadways, reduces the freight carbon footprint to the state, and provides businesses and industries with an alternative and often less expensive option to move materials and goods, thereby reducing production and distribution costs and making Ohio businesses more competitive. As an example of this, NS serves two mines in Eastern Ohio, moving over 10 million gross tons of coal to a river barge facility less than 20 miles away. This "short-haul" rail initiative removes approximately 400,000 fully loaded coal trucks from the state's highway system. The rail industry also offers the opportunity to not only move people and goods in a fuel-efficient manner, but will also participate significantly in the transition to alternative energy sources such as ethanol, bio fuels, and wind energy.

Improvements to the freight rail network with strategic investments by both the private and public sectors can significantly increase the level of these benefits.

## 6.6 Summary

A reliable, efficient, well-maintained rail transportation system is essential to having a competitive and sustainable economy for Ohio, the region, and the nation. Rail provides Ohio business and industries a low cost transportation option for moving goods and resources within, into, out of, and through Ohio. Rail transportation is increasingly being considered a preferred alternative due to its ability to relieve congestion, concentrate development patterns, and offer a competitive advantage to business and industries in the state.

Rail transportation also has a lower environmental impact than truck and passenger vehicle transportation. As stewards of the environment, it is critical that Ohio continue to promote energy efficient transportation choices, especially rail transportation. Rail service cuts fuel consumption, leading to less dependence on foreign petroleum.

Greater reliance on freight rail will also reduce the need for highway construction. Expansion of the highway system often causes the loss of economically, environmentally, and historically valuable land, which, in turn, can contribute to inefficient land use patterns. With an enhanced focus on Smart Growth, ODOT is committed to transportation choices that support efficient land use patterns.

Preserving Ohio's railroad network and improving its access to freight and intermodal facilities must continue to be a priority for Ohio as a means to address future economic development initiatives, as well as to provide the state's business communities with expanded transportation options.