

URBAN FREIGHT TRANSPORTATION

Low Cost Measures to Reduce Negative Impacts
May 2014



mayors innovation project

SUMMARY

Freight transportation is a critical element of both national and local economies but creates a number of challenges for cities due to congestion, emissions, crashes, noise and other factors.

While taxes and fees help defray some freight-related costs, cities bear many others that are not recouped.

Cities should work with stakeholders, including the freight industry, air and seaports, local businesses, and residents, to implement strategies to reduce the negative impacts of urban freight transportation.

With limited revenues available for transportation projects, cities should look towards low cost policy-driven measures to reduce the negative impacts of freight transportation, particularly on environmental justice communities.

This brief was written by Bill Holloway, Chris Spahr, and Satya Rhodes-Conway. Mr. Holloway is a transportation policy analyst for the State Smart Transportation Initiative. Mr. Spahr is a project assistant for the State Smart Transportation Initiative. Ms. Rhodes-Conway is the managing director of the Mayors Innovation Project and a former councilmember in Madison, Wisconsin.

INTRODUCTION

With a variety of factors shrinking the amount of funding available for transportation investments, cities face the challenges of maintaining existing infrastructure, reducing congestion and environmental impacts, and promoting equity and economic development on substantially diminished budgets. Limited funding and new priorities have created the need for a more strategic approach to transportation system management than simply widening roads.

This brief focuses on relatively low cost strategies that cities can use to squeeze more value from their existing transportation systems through policies that shift freight transportation routes and schedules or encourage vehicular or operational changes. The first section provides a short overview of freight transportation and the relationship between freight transportation and cities. The second section details the costs to society associated with urban freight movement. The third section describes strategies that cities have successfully used to reduce these costs while maintaining or improving the efficiency of their freight transportation system. The fourth section focuses on policy changes that airports, seaports, and railroads can make to reduce the negative impacts of their operations on their communities. Although cities often lack the authority to force changes at these facilities, by forging partnerships, rallying public support, and using the authority they do have, they can persuade facility owners to adopt policies to reduce the negative impacts of their activities. The fifth and final section provides a comparison of the strategies and recommended first steps for cities beginning to explore new freight transportation solutions.

FREIGHT TRANSPORTATION IN CITIES

Freight transportation underlies the modern global economy. Goods consumed in the United States come from all over the world and those produced here are often assembled from raw materials and component parts imported from elsewhere. These goods move by air, sea, road, rail, pipeline, and inland waterway. Because of the vast extent of the US road and highway network, trucks have the greatest access to shippers and receivers. This access, along with trucks' versatility and speed, has made trucking the nation's top mode of transportation by all relevant metrics.¹

Trucking is the glue that links all other freight transportation modes with one another and with the origins and destinations of goods. Because few businesses or consumers have rail access on their premises and even fewer have airstrips or access to navigable inland waterways, seaports, or pipelines, goods moving by air, water, rail, and pipeline usually travel their first and last miles by truck. Trucks are also used to haul freight between rail lines or between seaports and rail yards, when direct connections are congested or unavailable. However, the efficiency and flexibility of trucks for moving freight come with costs. Because they operate on public infrastructure, compete for space with other road users, move

throughout the entire urban area, and generate more pollution and safety concerns than competing modes, trucks are both the freight transportation mode of greatest concern to most cities and the mode that local governments can most effectively control.

Cities have historically been sited near strategic natural features such as harbors and navigable rivers and, later, became the hubs of new railroad and highway networks. Access to multiple modes of transportation has helped to boost the economies of many cities and has attracted freight-dependent industries. However, the airports, seaports, rail yards, and highways that have attracted industry also generate a great deal of truck traffic along with their planes, ships, and trains. Some of these trucks serve businesses and end consumers in the urban area but many others carry goods directly to and from more distant locations or shuttle freight between ports, rail yards, and distribution centers around the region.

In cities where freight facilities are in close proximity to residents, they tend to disproportionately impact economically disadvantaged communities.

Dense city populations and congested conditions on urban roadways make the impact of additional trucks particularly acute. While an additional truck on a free flowing highway has little impact on the travel speeds of other road users, the impact of each additional truck on an already congested urban roadway makes overall congestion and related problems worse. The close proximity of residents to roadways and other freight transportation facilities in urban areas presents a different set of problems. A common quip among air pollution experts is: “the solution to pollution is dilution.” As air emissions disperse in the atmosphere, the health risks they represent diminish. The logic behind smoke stacks at factories and power plants, for example, is that they raise the emissions above ground level, where they can mix with the atmosphere and be dispersed by prevailing winds before people are exposed. Similarly, emissions released by trucks and trains in rural areas, planes in the sky, or ships on the high seas have much less of an impact on human health than emissions released by trucks and trains in cities or by ships docked at urban ports, which reach nearby residents in a more concentrated state. Other impacts of freight traffic on residents, such as noise and vibration, similarly decline rapidly with distance.

In cities where freight facilities are in close proximity to residents, they tend to disproportionately impact economically disadvantaged communities due to the lower land values and cheaper rents in neighborhoods abutting freight facilities. Alleviating these disproportionate impacts on vulnerable populations is one of the goals of the environmental justice movement and has been a federal priority since Executive Order 12898 was signed in 1994.

Another major concern closely tied to urban freight transportation is the emissions from vehicles and their contribution to climate change. Climate change is unique among the impacts of freight transportation because its costs are dispersed across the globe rather than concentrated in the area where emissions occur. The issues of environmental justice and climate change have both prompted new legislation and policies in recent years and are an increasingly high priority in cities across the U.S. Urban economies rely on efficient freight transportation but the costs to society, in terms of pollution, safety, roadway construction and maintenance, noise, and other factors, can be severe. Over the next few decades, these issues are expected to grow more acute, as Americans increasingly make their homes in the nation’s largest metropolitan areas and freight volumes continue to grow at an estimated 1.4 percent per year.²

URBAN FREIGHT’S HIDDEN COSTS

The costs of urban freight transportation are borne by all of society, not just those actively involved in moving goods. These costs include construction and maintenance of roads, traffic enforcement, crashes,

health problems related to noise and pollution, and the impacts of climate disruption, particularly extreme weather events. According to Government Accountability Office (GAO) estimates, each million ton-miles (a unit of freight transportation measurement equal to one ton moved one mile) of freight transported by truck generates more than \$58,000 in costs to society compared to around \$9,000 for rail freight.³ The following table details the costs to society of infrastructure damage, emissions, congestion, and crashes attributable to trucking and rail freight reduced by the marginal taxes and fees they pay.

table 1

Estimated Marginal Societal Costs Attributable to Truck and Rail Freight Not Passed on to Consumers, per Million Ton-Miles (in 1000s of 2013 dollars)

	<i>Trucking</i>	<i>Railroad</i>
Marginal Social Costs		
Marginal Public Infrastructure Costs (e.g., pavement preservation costs) ^a	\$7	-
Emissions of Particulate Matter and Nitrogen Oxide	\$47	\$9
Accidents	\$9	\$1
Congestion ^b	\$7	-
Marginal Taxes and Fees		
Taxes and Fees Associated with Marginal Freight Activity	\$12	-
Marginal Social Costs Not Passed on to Consumers		
Unpriced Costs – Marginal Social Costs Minus Taxes and Fees Associated with Marginal Freight Activity	<i>Over \$58</i>	<i>Over \$9 (but less than trucking costs that are not passed on)</i>

Source: Government Accountability Office, *Surface Freight Transportation* (2011).

a Infrastructure costs and taxes and fees represent averages of data from fiscal years 2000 through 2006.

b Costs attributed to congestion result from railroad operations but are significantly less than those resulting from trucking.

Another important cost associated with freight movement is that of greenhouse gas emissions, which trap heat in the atmosphere, contributing to global climate change. The social costs of greenhouse gases as a result of freight transportation have not been specifically quantified. However, Natural Resources Defense Council (NRDC) estimated that the federal government spent \$96 billion in 2012 to mitigate disruptions by extreme weather events caused by global climate change. This figure exceeds federal spending on all other non-defense programs like education and transportation.⁴ With a majority of US cities and people located along the coasts, the impacts to cities from storms and sea level rise could be very costly.⁵

In 2011, the transportation sector was responsible for about 28% of total U.S. greenhouse gas (GHG) emissions, up from 25% in 1990.⁶ As shown in Figure 1, while passenger vehicles account for over half of the GHG emissions from transportation, freight modes account for most of the rest. Trucks alone account for 22% of transportation GHG emissions.

CITY-DRIVEN STRATEGIES TO REDUCE THE NEGATIVE IMPACTS OF URBAN FREIGHT TRANSPORTATION

The traditional solution to improving urban mobility and reducing congestion has been highway and road expansion. However, congestion normally begins increasing immediately following the completion of these projects, eventually cancelling out the benefits of expansion as latent demand and additional development at the urban fringe generate new traffic. Successive highway expansion projects in developed urban areas come with increasingly high costs—increased pollution, noise, traffic injuries and fatalities, acquisition of right-of-way, roadway construction and maintenance, reduced property tax revenue, and others.⁷

The strategies profiled below are much lower in cost than those involving infrastructure expansion and can achieve many of the same goals. Many of them can be considered freight transportation demand management (TDM) strategies. Freight TDM “help[s] to increase overall transportation system efficiency by shifting the routes, travel times, operational characteristics, or transportation modes used to move goods in order to maximize the values of existing transportation infrastructure.”⁸

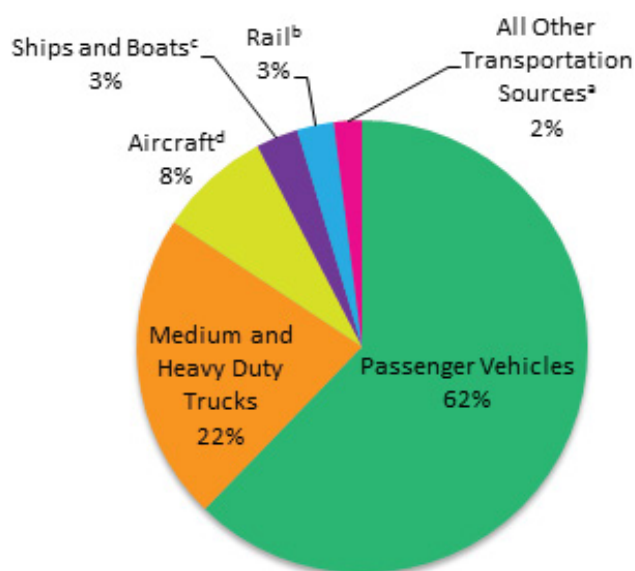
Anti-Idling Policies

Over 110 states and local governments in the U.S. have implemented restrictions on idling in order to reduce harmful emissions and noise. The goals, vehicles covered, idling time limits, enforcement, exemptions, and penalties vary widely across locations. While these policies may cover all types of motor vehicles, trucks are the most commonly targeted.⁹ Effective public outreach, consistent enforcement, and appropriate penalties for violations are critical to ensure the efficacy of anti-idling regulations.

Minneapolis adopted its Anti-Idling Vehicle Ordinance¹⁰ in 2008 to improve air quality, reduce energy consumption, protect human health, and improve engine performance and longevity.¹¹ The ordinance includes up to a \$200 fine on vehicle operators for idling more than 5 consecutive minutes under normal operations and for more than 30 consecutive minutes at loading and unloading locations. Exemptions include idling in extreme temperatures to protect human health and safety.

Cities interested in policies to reduce truck idling should consider how rules will be publicized, the logistics of enforcement, penalties, and who bears responsibility for violations. Changes in driver behavior are most likely to result from a combination of education, consistent enforcement, and penalties that are high enough to deter would-be violators. Because non-owner drivers are often unable to make changes or improvements

figure 1
Transportation Greenhouse Gas Emissions by Source



Source: U.S. Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2011, April 12, 2013. <http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-Main-Text.pdf>.

a This includes pipelines and lubricants.

b While this does not differentiate between passenger and freight rail, GHG emissions associated with passenger rail are responsible for a very small percentage of overall rail GHG emissions.

c This does not differentiate between cargo ships and passenger boats.

d This does not differentiate between passenger and freight aircraft.

to their vehicles, it is important to designate responsibility for violations to vehicle owners and/or property owners, as well as drivers, to ensure equitable enforcement of anti-idling rules. Sufficient penalties provide a strong reason for vehicle owners to invest in auxiliary power units (APU) or other idle reduction technologies. Similarly, if property owners are held liable for idling violations on their property, they will be more likely to enforce anti-idling standards on their own. Early involvement of the community and industry stakeholders, particularly vehicle operators, during policy development is important to ensure that idle reduction measures will be equitable and effective.

Develop a Truck Route Network

Designating selected roadways as truck routes is a very common strategy to facilitate the movement of freight in cities and reduce its negative impacts. Specifying certain routes as truck routes allows local governments to:

- » Be strategic about directing infrastructure investments to meet the needs of primary road users
- » Limit the exposure of residents to the noise, vibration, and emissions associated with truck traffic
- » Reduce conflicts between trucks and other road users

Cities have had success with a variety of different truck route designation systems but face similar issues when developing their networks. Truck routes slated for industrial areas and undeveloped areas are unlikely to arouse controversy. However, proposals for new truck routes near residential areas and schools often face significant resistance and, where possible, designated routes should avoid these sensitive areas. There are many different ways that cities can affect the routes trucks use when moving through the urban area as evidenced by the approaches taken by the cities of Berkeley, CA, Phoenix, AZ, and New York, NY.

Berkeley implemented one of the most common strategies of managing freight travel demand with its truck route network. Trucks in Berkeley can only travel on non-truck route streets when arriving at pick-up and delivery locations and they must use the shortest possible route between the designated truck route and their destination. Otherwise, trucks are required to stay on designated truck routes as much as possible. In addition to the regular truck routes in the city, trucks are permitted to travel on some other roads if they meet the posted weight limit requirements (three-, four-, or five ton maximums). Trucks under these limits can use these roads as truck routes; trucks exceeding the limits can operate on weight-limited routes as they would on off-network streets.

Phoenix classifies the majority of its arterial street network as truck routes. Trucks are permitted to use non-arterial streets for pickups and deliveries but must use the shortest route from the arterial network. Phoenix created this designation to promote mobility for trucks and dilute the adverse impacts associated with heavy vehicle movement.¹² No residential areas are located on arterial routes in the city, thus community impacts are reduced.¹³ In addition to the truck route designations, the city restricts truck traffic in two zones of the central business district during certain hours; however, all major highways, including those in truck restricted zones, are considered “through truck routes” where trucks are permitted at all times.¹⁴



Source: Marcin Wichary, CC BY 2.0.
New York, NY.

The New York City’s THRU Streets Program which restricts vehicles from turning off of certain streets in Midtown Manhattan between the hours of 10:00 a.m. and 6:00 p.m. has eliminated the congestion associated with vehicles waiting for pedestrians before making a turn.¹⁵ Many carriers now divert to the THRU streets in order to make more

efficient cross town movements which has resulted in reduced traffic on “Non-THRU” streets. New York City also has a complex truck route network but the THRU Streets Program is an example of how cities can adjust the routes that trucks use with a carrot rather than a stick by implementing policies that make certain routes more efficient.

Before designating truck routes, cities should first study the flow of trucks and ensure that potential truck routes meet connectivity and road geometry requirements. It is also important that cities coordinate with local transportation planning authorities, freight transport industry stakeholders, and neighboring jurisdictions so that truck routes are connected across municipalities, serve key destinations, and avoid sensitive populations. Additionally, truck route networks should be clearly mapped and identified by signage. Cities should also consider adjusting traffic signal timing on these routes to accommodate the slower acceleration and deceleration of trucks.¹⁶

Change Pickup and Delivery Hours

There are two primary goals that cities seek to accomplish using policies that change pickup and delivery hours:

- » Reduce the truck-related congestion during peak travel times.
- » Reduce exposure of residents to truck-related noise during nighttime hours.

These two goals are contradictory. In metropolitan areas facing highway capacity constraints, restrictions on nighttime delivery constrain business logistics decisions and force trucks to travel during congested daytime hours, exacerbating congestion and increasing costs to businesses, residents, and other drivers. Figure 2 details the way local nighttime delivery restrictions negatively impact the entire regional transportation network.

figure 2
Unintended Consequences of Nighttime Delivery Restrictions



Source: Cambridge Systematics, “Regional Freight Systems Planning,” presented to CMAP, September 2, 2009.

Because of the many unintended consequences that result from blanket restrictions on nighttime delivery, cities should instead look towards more targeted parking, zoning, anti-idling and truck route policies to combat the problematic issues associated with nighttime truck traffic.

For cities and regions interested in reducing peak period congestion by shifting freight traffic to off-peak hours, partnering with industry to develop voluntary off-peak pickup and delivery programs can achieve significant benefits without antagonizing freight carriers or incurring large enforcement costs. Cities can often work with local businesses to encourage off-peak pickup and delivery in cases when nighttime staff is available or when facilities allow drivers to load or unload their goods without assistance from on-site staff.

More than 430 million tons of freight traveled through New York City in 2004 and nearly 90% of this traveled by truck. This volume of freight is expected to double by 2030. With most of the freight deliveries occurring during daytime business hours, New York City Department of Transportation (NYCDOT) has a need to explore innovative solutions to reduce congestion and the associated noise and emissions.

In August 2009, NYCDOT conducted a pilot program to introduce off-peak deliveries to carriers and receivers. In collaboration with a consortium of research institutions led by Rensselaer Polytechnic Institute, NYCDOT coordinated with eight delivery companies and 25 businesses to offer financial incentives and innovative ideas to aid in off-peak deliveries.¹⁷ Two of the strategies introduced were “unassisted delivery” and low-noise infrastructure at delivery sites.¹⁸ Unassisted deliveries are those occurring outside of normal business hours without assistance from staff at the receiving business. Normally this involves the use of segregated delivery areas where drivers can leave goods without entering the rest of the building. To reduce nighttime noise and disturbances to residential areas, low-noise gates and loading docks were introduced.

Partnering with industry to develop voluntary off-peak pickup and delivery programs can achieve significant benefits.

To assess the effectiveness of the pilot program, GPS devices were placed in the vehicles of project participants so that travel speeds for carriers during off-peak times could be recorded. Carriers traveled about eight miles per hour on average during off-peak times compared to three miles per hour during regular hours resulting in a calculated savings of 1.25 hours per tour during off-peak time periods assuming a truck is traveling 10 miles from customer to customer. Overall, travel speeds to the first stop improved by up to 75 percent and decreased delivery time from 100 minutes to 30 minutes. By reducing peak period congestion, the program likely also reduced the health impacts of freight delivery on residents as well.

Potential costs of shifting to off-peak deliveries include staff time for those receiving the deliveries. However, staffing costs can be reduced if carriers and receivers can coordinate unassisted deliveries. For cities interested in shifting a portion of daytime truck traffic to less congested hours, developing solutions in concert with freight transportation industry stakeholders is often the path of least resistance. Voluntary, incentive-based systems to encourage off-peak pickup and delivery can achieve significant benefits without inciting industry opposition.

Intelligent Transportation Systems

The Federal Highway Administration defines intelligent transportation systems (ITS) as “electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.” Some of these technology-based solutions include variable message signs, real-time GPS guidance and traffic updates, as well as web-based vehicle scheduling and load matching systems. While there are safety concerns related to the use of mobile apps during vehicle operation, dynamic

messaging signs, audio information, and the use of mobile apps by drivers when safely parked can all improve transportation system efficiency, lowering costs and emissions. ITS strategies present affordable alternatives to large-scale infrastructure projects and often have wide appeal. In addition, ITS technologies used by the private sector to avoid traffic jams, reduce empty truck trips, or otherwise increase efficiency often benefit the rest of society as well by reducing congestion and emissions. Many valuable ITS technologies, such as traffic and transit mobile applications, have been developed by the private sector using public sector data. Making transportation data freely available can yield significant benefits at a minimal cost.

Variable message signs are used to alert motorists to incidents, road construction, and other traffic disruptions, and to guide motorists to alternate routes.

The Kansas City, MO region's traffic management system, KC Scout, uses variable message signs to provide information to drivers about traffic incidents, roadwork, and highly congested areas.¹⁹ The signs reduce truck idling by alerting trucks to use alternate routes to avoid being stopped in congestion and can also give truck drivers directions to available parking areas, reducing the amount of congestion attributable to trucks searching for parking.

Some ITS applications, such as dynamic traffic management and variable message signs, fall within the purview of the public sector while others are largely developed and operated by carriers, ports, or other private sector firms. Even private sector ITS activities, however, often require or benefit from sharing public sector data.

Cities, states, and MPOs should provide private sector ITS developers with requested data whenever feasible because improved efficiency for freight carriers is generally in the public interest. Madison Wisconsin's recently enacted ordinance²⁰ which provides for open access to municipal data sets has opened the city's data to outsiders. Private sector ITS developers can use data on congestion, road construction, speed limits, and truck routes to develop tools useful to the freight industry. Cities should also look at how their ITS systems can be improved to better assist freight carriers to increase efficiency.



Source: MoDOT, CC BY-NC-SA 2.0
Kansas City Scout Offices, Lee's Summit, MO.

Land Use Strategies

Industrial waterfront lands, as well as other centrally located industrial sites, are under pressure in many cities for redevelopment for other uses. Often, because of their very high relocation costs, rail yards and ports remain in central city areas while associated freight activities such as distribution centers, factories, and warehouses move to the urban fringe, resulting in increased truck traffic, congestion, and emissions. In order to counter these negative impacts and boost economic development and livability, many cities and MPOs are focusing on land use strategies that maintain freight activities in the central city. Zoning codes are one of a city's most effective tools to retain freight intensive land uses in urban areas, minimize conflicts with neighbors, and promote environmental justice. Isolating freight from other land uses and locating freight intensive uses near key transportation infrastructure is generally well received by residents and businesses. However, preserving land for industrial purposes when it could be used for new commercial or residential development often draws opposition from businesses and residents. Educating the public about the job, economic development, environmental, and transportation benefits of centrally located industrial areas is another way to make preserving them more palatable. In places where freight facilities are to be preserved in close proximity to non-industrial neighbors, requiring that freight loading areas be shielded by landscaped buffer zones to reduce noise and visual impacts on residential neighbors can mitigate potential conflicts.²¹

As high-end residential development began to encroach on its industrial waterfront areas, Baltimore, MD implemented the Maritime Industrial Zoning Overlay District (MIZOD) in 2004.²² The MIZOD overlays the area

zoned for heavy industrial use to preserve waterfront property with unique freight transportation assets such as berthing depths sufficient for large ships and good access by highway or rail. The MIZOD, which will remain in place until 2024, preserves valuable waterfront lands by:

- » Prohibiting Planned Unit Developments (PUD)
- » Prohibiting all uses not permitted in M-3 districts
- » Permitting offices and restaurants as accessory uses only
- » Maintaining the heavy industrial (M-3) zoning designation in MIZOD areas

Developing land use strategies that benefit industries that rely on freight transportation and reduce the negative impacts of freight transportation on the community requires involvement of residents and businesses, as well as carriers. Understanding the network's highways, waterways, and railroads, as well as freight traffic patterns and centers of freight activity, is critical to identifying areas for industrial land preservation and development. Additionally, design criteria for roadways, such as overhead clearances that accommodate trucks, intersections that provide adequate space for truck turning movements, and signage and signalization that direct truck traffic should be considered when implementing freight land use strategies.

Parking Policies

Ensuring the availability of curbside parking space for commercial vehicles reduces congestion by minimizing the need for trucks to double park and increases pickup and delivery efficiency. Some of the strategies cities have used to improve parking availability for freight loading and unloading in congested downtown areas include:

- » Lengthening curbside truck parking areas and locating them at the end of blocks to improve accessibility for trucks,
- » Requiring trucks to pay for curbside parking space to increase turnover,
- » Installing signage that requires trucks parked in these areas to be actively engaged in loading or unloading to prevent trucks being stored in valuable public street space,
- » Rigorous and consistent enforcement of parking ordinances to ensure they are taken seriously,
- » Education and outreach to the freight community to increase acceptance of new regulations and solicit suggestions for improvement,
- » If the lack of truck parking availability continues to cause problems, increasing the number of truck parking spaces in high traffic downtown areas can help reduce truck traffic and reduce business transportation costs.

Understanding the challenges faced by truck drivers who pick up and deliver goods in downtown areas is critical to creating effective parking solutions.

Understanding the challenges faced by truck drivers who pick up and deliver goods in downtown areas is critical to creating effective parking solutions. Implementing parking policies is relatively inexpensive and is often welcomed by carriers due to the resulting turnover of vehicles in loading zones and reduced downtown congestion.

In 2001, New York City implemented its *Commercial Vehicle Parking Plan* on severely congested streets in Midtown Manhattan to combat the City's truck parking problem.²³ The City replaced single-space parking meters with "Muni-meters" for commercial vehicle operators to purchase parking passes allowing them to park for up to three hours.²⁴ Delivery industry stakeholders generally view the changes positively; while they must now pay for parking, their overall costs have declined due to drivers receiving fewer parking violations.²⁵

Policies that ensure adequate parking space for carriers who are actively engaged in loading and unloading reduce congestion, improve air quality, and improve transportation efficiency. Time-limited parking meters for commercial vehicles generate revenue that can pay for enforcement while clearly identifying violators and creating an incentive for drivers to use spaces efficiently. Signage specifying parking only for "active" loading and unloading is another low cost way to prevent drivers from parking their vehicles in valuable loading and unloading areas. Finally, increasing the number and size of curbside loading zones to make them more accessible for trucks may also be necessary.

Before changing their parking policies, cities should collect data to help them better understand the challenges facing delivery trucks in downtown areas, such as:

- » The average time needed by carriers for loading and unloading
- » The reasons truckers violate existing parking regulations
- » Rates of utilization of the loading zones in various locations throughout the day

Planning Information Strategies

Cities work hard to avoid transportation and land use conflicts when developing new truck routes, zoning codes, and making other policy changes. However, gathering information about land uses and policies in neighboring jurisdictions is time consuming and, particularly in large regions that may contain dozens of municipalities, may not be feasible for individual cities to do on their own. Creating an easily accessible clearinghouse for information on freight-related policies and land uses throughout the region can help municipalities avoid generating new land use and transportation conflicts.

In Philadelphia, PA the Delaware Valley Regional Planning Commission (DVRPC) identified "freight centers," which are defined as facilities dedicated to manufacturing, distribution, transportation, mining, or utilities along with key freight corridors, pipelines, waterways, highways, and railroads that carry freight in the region. DVRPC then mapped these facilities and corridors, making them available to stakeholders through an online mapping application. The application, known as the PhillyFreightFinder, helps planners and the public understand the regional freight system, locate freight intensive land uses, and avoid transportation and land use planning conflicts.

Regional planning agencies are particularly well suited to facilitate information sharing among their constituent jurisdictions.

However, cities, particularly those that anchor metropolitan areas, can also initiate a dialog. Highlighting obvious problems, such as designated truck routes that dead end at municipal boundaries, can help catalyze intraregional coordination efforts.



Source: thisisbossi, CC BY-NC-SA 2.0
Philadelphia, PA.

REDUCING THE NEGATIVE IMPACTS OF AIRPORTS, SEAPORTS, AND RAILROADS

Although truck traffic generates more health, safety, congestion, and sustainability impacts than other modes of freight transportation, its impacts are generally spread out across the street and highway network except at major freight nodes such as airports, seaports, and rail yards. The cumulative impact at these facilities of this truck concentration combined with the impacts of the planes, ships, and trains serving them are often a serious problem for nearby residents. Despite the strong feelings that many of these facilities evoke among their residential neighbors, implementing changes to reduce their negative impacts is difficult due to their governance structures and limitations on local control as a result of federal primacy over interstate commerce.

The governance structures of railroads, airports, and seaports vary widely but often insulate their decisions from the concerns of residents. Of the three, railroads are the least accountable to local governments. Almost all railroad infrastructure in the U.S. is privately owned and local and state government regulation is generally preempted by federal law if the railroad is engaged in activities related to transportation.²⁶ Seaports may be entirely private or controlled by states, counties, municipalities, or port authorities—most often governed by a commission composed of local, state, and/or county appointees.²⁷ Port authorities may control more than one seaport and may also control airports, bridges, and other transportation assets. Governance of airports is similar to that of seaports, and the overwhelming majority of passengers and freight pass through publicly owned facilities. Publicly owned airports may be owned by cities, counties, or states and may be controlled either directly through a general purpose government or through a special purpose entity, such as a port or airport authority.²⁸ However, due to the federal government's authority over interstate commerce, even sea- and airports controlled by a local government do not always have a free hand to implement the changes they would like. To complicate matters, it is often unclear whether a certain state or local regulation is preempted by federal authority and defending regulations from legal challenges is costly and time consuming.

Despite the challenges, many communities have succeeded in working with airports, seaports, and railroads to reduce the negative impacts of their activities on nearby residents. Some of the biggest successes have resulted from citizen activism and pressure from local and state governments on facility owners, who can use public recognition and financial incentives to push carriers to adopt more sustainable practices.

Strategies to reduce the negative impacts of these types of freight facilities can be divided into those that reduce noise and emissions generated on facility grounds and those that reduce the impacts of trains, planes, ships, and/or trucks traveling to and from them.

Inside the Gates

On freight facility grounds noise and emissions are generated by cargo handling equipment, such as forklifts and cranes, as well as by the vehicles that carry goods outside facility gates. Ships have traditionally used their engines to power their electrical systems while in port during loading and unloading. Requiring ships to use cleaner fuels or connect to the local electrical grid when they are in port rather than power their on-board systems by running their auxiliary engines can significantly cut ship-related emissions.

The Port of Seattle, WA's At-Berth Clean (ABC) Fuels Program encourages ships calling at the Port to voluntarily switch to cleaner burning fuels and offers incentive payments based on fuel type and amount used.²⁹ The incentive payments are meant to mitigate the incremental cost of burning lower sulfur fuel while berthed at the port and ships can receive up to a maximum of \$3,780 per vessel call.³⁰ In order to



Source: Washington State Dept of Transportation, CC BY-NC-ND 2.0
Port of Seattle, WA.

qualify for the incentives, ships must call at the port at least five times per year, meet reporting requirements, and burn fuel of 0.5% sulfur or less while at berth.³¹

The Port Authority of New York & New Jersey (PANYNJ) recently reauthorized a project to install shore power facilities at cruise ship berths at the Brooklyn Cruise Terminal in the Red Hook neighborhood of New York City. The project will reduce fuel consumption by cruise ships while at berth, improve air quality, and provide health benefits to nearby residents.³² The cost of electricity provided to the cruise ships will be divided between Con Ed, the electrical utility, and Carnival Corp., the cruise ship operator.³³ Similar infrastructure at airports can reduce emissions from idling planes.

While federal limits on the sulfur content of the diesel fuel that is used by cargo handling equipment have become more stringent in recent years, many seaports and other freight facilities have taken additional steps to reduce pollution from these sources, by upgrading cargo-handling equipment to meet more stringent emissions limits. PANYNJ's Clean Air Strategy, adopted in 2009, outlines a number of actions the Port Authority has taken to reduce emissions from cargo handling equipment (CHE) along with a schedule of additional measures to which it has committed through 2014.³⁴ As of 2009, CHE fleet emissions had already been significantly reduced through a combination of activities including implementation of an anti-idling program, installation of active diesel particulate filters on equipment, and switching all diesel powered CHE to ultra-low sulfur fuel.³⁵

Outside the Gates

Many of a freight facility's largest impacts are generated outside its gates. Inbound and outbound trucks, trains, ships, and planes all produce significant noise and emissions. While cities can change truck routes and reduce truck idling on their own, unless they have direct control over the airport or port authority, cities have little ability to increase the stringency of truck emissions standards beyond state and federal requirements or to force changes in train, plane, or ship operations. However, even when they lack control, cities can effect change in these areas by putting pressure on freight facility operators and freight carriers to reduce the impact of their activities.

The Ports of Los Angeles and Long Beach, CA have been leaders in reducing the impacts of the truck fleets that serve them by reducing their emissions and shifting much of their activity to less congested hours. The ports implemented a schedule of progressively more stringent emissions requirements between 2008 and 2012 and offered financial assistance to help carriers purchase or lease compliant vehicles or retrofit their existing vehicles to bring them into compliance.^{36,37} As of January 2012, when the most stringent emissions requirements were implemented, truck emissions at the ports had declined by 80 percent from 2007 levels.³⁸ Prior to implementation of the Clean Truck Program, the California Air Resources Board estimated that Southern Californians suffered between \$100 and \$590 million in health impact costs from drayage truck emissions annually.³⁹ The Clean Truck Program is expected to dramatically reduce these impacts. The program initially included a provision requiring that all drivers be employees of licensed motor carriers, rather than contracted owner-operators. The goals of this provision was to make the system more manageable by simplifying communication between the ports, motor carrier companies, and drivers, eliminating the need for the port to communicate with thousands of individual owner-operators.⁴⁰ Additionally, requiring drivers to be employees would make it harder for businesses to pass compliance costs on to individual drivers. However, the restriction on owner-operators was among several provisions challenged by the American Trucking Associations (ATA). The Port of Long Beach reached a settlement with



Source: sunslate, CC BY-NC-ND 2.0
Port of Long Beach, CA.

the ATA eliminating the provision, and at the Port of Los Angeles it was later struck down in court.⁴¹

In 2005, marine terminal operators at the Ports of Los Angeles and Long Beach launched the OffPeak program to increase the share of port truck trips being made during nighttime and weekend hours. As freight volumes grew throughout the 1990s and early 2000s, nearby communities and their elected officials had become increasingly concerned about truck-related congestion and emissions in the area. Concerned that the state would levy a fee on containers moved during peak traffic periods, terminal operators at the Ports formed a non-profit company to administer the OffPeak program, which promotes off-peak delivery. The program requires that all international container terminals establish at least 4 off-peak shifts each week for container pickup. Off-peak periods are from 6:00 p.m. to 3:00 a.m. on weekdays and 8:00 a.m. to 5:00 p.m. on weekends.⁴² To offset the additional costs of operating the terminals at night and on weekends and to create an incentive for carriers to operate during off-peak hours, a traffic mitigation fee (TMF), currently \$66.50 per 20-foot container, is assessed on containers picked up between 3:00 a.m. and 6:00 p.m. on weekdays.⁴³ Most container moves now occur during off-peak times and the program has significantly reduced congestion and emissions.⁴⁴

The Port of San Diego's Vessel Speed Reduction (VSR) program is a voluntary strategy to limit near-shore air pollution from cruise ships and cargo vessels. The Port asks that cruise ships travel no faster than 15 knots and that cargo ships limit their speed to 12 knots within 20 nautical miles of Point Loma, at the entrance to San Diego Bay. While the program is voluntary, the Port produces quarterly reports identifying participating vessel operators. Operators are classified as compliant if they obey the voluntary limit for 90 percent of their calls to the port. To alleviate concerns that slower moving vessels would suffer from reduced access to labor, since labor assignments had previously been made upon a ship's arrival at a terminal, the port now makes labor assignments based on when ships reach the VSR

Social Justice and Ports

Local governments have a strong and legitimate interest in making sure that ports and airports, which provide important public services, maintain safe working conditions and provide quality jobs.



Quality jobs are important for the local economy, of course, but they are also important to maintain labor peace at these institutions in order to prevent service interruptions. So it is in the local government's interest to promote or protect the right of workers to family-supporting wages, adequate benefits, safe and fair working conditions, and the right to organize for all of the above. Whenever possible, local governments should require common-sense job-safety and job-quality measures. The most basic of these are affordable and accessible employer-provided health care for workers and their dependents, paid sick leave for workers to recover from illness or to care for a child or immediate family member, and family-supporting wages for all classifications of workers. These measures benefit employers as well. When the San Francisco Airport Commission established a mandated minimum wage plus benefits and paid leave, employee turnover fell by approximately 30 percent.⁵⁰

Another way to maintain workforce consistency in these institutions is to adopt worker-retention policies for their contracts. Such a policy would provide for a 90-day transition period in which incumbent workers can only be terminated for cause or where the successor contractor determines lower staffing levels are needed to perform services under the contract. New York, NY⁵¹, Los Angeles, CA⁵², Philadelphia, PA⁵³, San Francisco, CA⁵⁴, St. Louis, MO⁵⁵, Washington, D.C.⁵⁶, and Newark, NJ,⁵⁷ all have policies requiring a successor contractor to retain the incumbent workforce.

zone.⁴⁵

Raleigh-Durham International Airport began working with local governments in the 1960s to reduce the impact of airport-related noise in surrounding communities and improve the safety of air traffic by implementing airport zoning districts within a few miles of the runways. Today, the nearby cities of Raleigh, Durham⁴⁶, and Morrisville⁴⁷ all have airport zoning overlay districts that restrict the development of new homes or other public gathering places in areas subject to high levels of noise. These areas also have restrictions on lighting, height, and roof reflectivity, to improve safety for aircrafts. In 1989, the Airport Authority adopted its Aircraft Noise Abatement Policy to further reduce aircraft noise impacts and improve communication with residents. The policy called for implementing operational changes to increase altitudes during takeoff and landing, using noise monitors to measure aircraft noise in the community, regularly publishing noise contour and flight track maps, and enacting a progressively more restrictive noise budget. By 2004 total aircraft noise exposure had declined to roughly one-third of its 1991 level.⁴⁸

While railroads are known for their inflexibility, the Federal Railroad Administration has established procedures that allow local governments to enact quiet zones—areas where trains do not sound their horns when they cross paths with roadways. New quiet zones must be at least one half mile in length and all at-grade roadway crossings in the zone must be equipped with required lights, gates, and signage.⁴⁹ Because the agency that controls the road at a rail crossing must apply for quiet zone status, if a proposed quiet zone includes county or state owned roads, the city will need to coordinate with the county or state along with the railroad and any state agencies that have jurisdiction over safety at railroad crossings. Installing required infrastructure at railroad crossings to enable their inclusion in quiet zones can be costly—up to several hundred thousand dollars at crossings that lack the required safety features.

Cities that directly control air- or seaports or are able to appoint members to the boards that govern these facilities will have a much easier time enacting measures to reduce impacts on surrounding areas. Even when cities do not have control, they can exert pressure on counties or states that have the authority to impose these types of policies. In addition, many businesses are eager to burnish their image as environmentally conscious and community minded, and they may be willing to enact desired changes voluntarily.

SUMMARY

There are many relatively low-cost ways to increase efficiency for businesses while reducing the social costs of urban freight transportation and promoting a more environmentally just system of freight movement. Many—particularly those concerning land use, planning, and truck operations—can be pursued by cities acting alone or in concert with local stakeholders. Effecting change in the operations of non-highway modes, however, or on freight facility grounds, is more complicated and often requires cities to work in concert with private railroads or quasi-governmental port and airport authorities.

While freight has received less attention, freight focused strategies may be the low-hanging fruit in many urban areas.

The tables below compare the effects of each strategy on external and private costs. Table 2 summarizes the impacts of city-centered strategies, i.e. those that cities can undertake on their own, and Table 3 details the impacts of partner-based strategies, those that normally require cooperation from private or quasi-governmental entities.

table 2
City-centered Strategies

Impact Reduction Strategy	External Costs				Private Costs		Ease of Implementation
	Congestion	Emissions	Safety	Noise	Shipper & Receiver Costs	Carrier Costs	
Anti-idling Policies	●	●	●	●	●	●	High
Truck Routes	●	●	●	●	●	Dependent on other variables	Medium
Promote Off-Peak Pickup & Delivery	●	●	●	●	Dependent on other variables	●	Medium
ITS Solutions	●	●	●	●	●	●	High
Land Use Strategies	●	●	●	●	●	●	Medium/ Low
Parking Policies	●	●	●	●	●	●	High
Planning Information Strategies	●	●	●	●	●	●	High

Beneficial Impact ●

Minimal Impact ●

Detrimental Impact ●

As cities struggle with increased congestion, the high costs of roadway construction and maintenance, and concerns about livability, they are also working to increase the sustainability of their transportation systems. Many of the steps cities have taken in this direction so far have focused on personal transportation, like promoting biking, walking, transit use, and flexible work hours. While freight has received less attention, freight focused strategies may be the low-hanging fruit in many urban areas. Many of these strategies are relatively easy to implement, promote economic and environmental sustainability, and can garner the support of both industry and residents. More importantly, these strategies can also help to remedy the environmental justice issues that were created by transportation decisions of the past.

table 3
Partner-based Strategies

Impact Reduction Strategy	External Costs				Private Costs		Cities' Ability to Influence
	Congestion	Emissions	Safety	Noise	Shipper & Receiver Costs	Carrier Costs	
Port / Airport Electrification ¹	●	●	●	●	●	●	Medium
Off-Peak Pickup Incentives	●	●	●	●	Dependent on other variables	●	Medium
Vessel Speed Reduction	●	●	●	●	●	●	Medium
Aircraft Noise Reduction	●	●	●	●	●	●	Medium
Replacement and Retrofit Programs ²	●	●	●	●	●	●	Low
RR Quiet Zones	●	●	●	●	●	●	High

Beneficial Impact ●

Minimal Impact ●

Detrimental Impact ●

¹ Installation of infrastructure that allows planes and ships to run onboard equipment with power from the electrical grid.

² These programs apply to both trucks and cargo handling equipment.

Because lower income residents often settle near freight facilities due to the greater availability of affordable housing, consideration of environmental justice is particularly important for those involved in freight transportation planning. The Atlanta Regional Commission (ARC) addressed the issue of environmental justice in its Regional Freight Mobility Plan. A key component of this study is the Community and Environmental Impact Scan and Assessment which addresses freight-related environmental justice issues in selected Atlanta neighborhoods and highlights best practices for addressing these conflicts.

Some of the suggested mitigation practices to reduce harmful impacts on disadvantaged communities included:

- » Implementing truck appointment scheduling systems to reduce idling;
- » Clustering industrial land uses and separating them from schools, hospitals, and residential areas;
- » Designating truck routes supported by a system of wayfinding signs;

- » Working with neighboring communities to address interjurisdictional issues that extend beyond political boundaries;
- » Adjusting timing of traffic signals to reduce idling;
- » Reducing speed limits;
- » Instituting quiet zones at railroad crossings;
- » Installing hush kits on aircraft to reduce engine exhaust and noise levels;
- » Using cleaner fuels;
- » Installing shore-side electrical power systems that allow ships to substitute electric power for diesel power while at berth.

Increasing the efficiency of freight movement and addressing the social costs and environmental justice issues of freight transportation are not mutually exclusive. The low-cost strategies identified in this report can help cities meet their transportation challenges in the years ahead while promoting just, healthy, and sustainable freight practices.

GETTING STARTED

1. Coordinate with neighboring jurisdictions to compile policies affecting freight transportation and map truck routes and key freight corridors and facilities to facilitate better cross jurisdictional planning.
2. Implement a truck route network, and target parking policies, infrastructure improvements, and truck-friendly signal timing to ensure safe, efficient truck access to customers, ease congestion, and limit truck traffic in sensitive areas.
3. Preserve key freight transportation assets and cluster freight land uses to reduce cross-town truck traffic and boost economic development.
4. Consider anti-idling rules, buffer zones around freight loading zones, or other targeted strategies to reduce truck emissions and nighttime noise rather than broad bans on nighttime delivery that exacerbate peak period congestion.
5. Work with freight carriers, ports (air and sea), terminal operators, freight railroads and other stakeholders to promote win-win solutions like scheduling deliveries for off-peak hours, implementing IT solutions to reduce miles traveled by empty trucks, and improving the fuel efficiency of trucks, ships, trains, and cargo handling equipment.

ENDNOTES

6. Freight Facts and Figures - 2012. Federal Highway Administration, 2012. http://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/docs/12factsfigures/index.htm.
7. Ibid.
8. Surface Freight Transportation. A Comparison of the Costs of Road, Rail, and Waterways Freight Shipments That Are Not Passed on to Consumers (U.S. Government Accountability Office, January 2011).
9. Daniel Lashof and Andy Stevenson, Who Pays for Climate Change? (Natural Resources Defense Council, May 2013), <http://www.nrdc.org/globalwarming/files/taxpayer-climate-costs-IP.pdf>.
10. Matthias Ruth, Dana Coelho, and Daria Karetnikov, The US Economic Impacts of Climate Change and the Costs of Inaction (Center for Integrative Environmental Research and the University of Maryland, October 2007), <http://www.cier.umd.edu/documents/US%20Economic%20Impacts%20of%20Climate%20Change%20and%20the%20Costs%20of%20Inaction.pdf>.
11. U.S. Environmental Protection Agency. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2011, April 12, 2013. <http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-Main-Text.pdf>.
12. Ebeling, Mary and Satya Rhodes-Conway, "Rethinking the Urban Freeway," Mayors Innovation Project, November,

2013. Available at http://www.mayorsinnovation.org/pdf/SURDNA_freeway%20brief.pdf.

13. Much of the information in this report draws from: Bill Holloway and Chris Spahr, *Getting the Goods without the Bads: Freight Transportation Demand Management Strategies to Reduce Urban Impacts* (University of Wisconsin, Madison: The Center for Freight & Infrastructure Research & Education and the State Smart Transportation Initiative, September 2013).
14. Idling Reduction Working Group, *Motor Vehicle Idling Restriction Review* (Louisville, KY, 2008).
15. City of Minneapolis, "City of Minneapolis Code of Ordinances," June 6, 2008, http://www.minneapolismn.gov/www/groups/public/@regservices/documents/webcontent/convert_283965.pdf.
16. American Council for an Energy-Efficient Economy, "Case Study - Minneapolis Anti-Idling Vehicle Ordinance," n.d., http://aceee.org/files/pdf/case-studies/Minneapolis_Anti-Idling.pdf.
17. City of Phoenix, "Digest of Truck Route Ordinances," April 6, 2005, http://phoenix.gov/webcms/groups/internet/@inter/@dept/@streets/documents/web_content/truckmap.pdf.
18. U.S. DOT Volpe Center, "Dundalk Area Truck Impact Study," November 2006, http://ntl.bts.gov/lib/35000/35500/35508/Dundalk_Area_Truck_Impact_Study_Report.pdf.
19. City of Phoenix. "Digest of Truck Route Ordinances," April 6, 2005. http://phoenix.gov/webcms/groups/internet/@inter/@dept/@streets/documents/web_content/truckmap.pdf.
20. New York City Department of Transportation, *Thru Streets - An Innovative Approach to Managing Midtown Traffic*, 2004, <http://www.nyc.gov/html/dot/downloads/pdf/thrustreetsreport04.pdf>.
21. Marsha Anderson Bomar, Erika Becker, and Edward Stollof, *Urban Freight Case Studies: New York* (The Federal Highway Administration, November 2009), <http://ops.fhwa.dot.gov/publications/fhwahop10019/fhwahop10019.pdf>.
22. Jose Huguin-Veras et al., *Integrative Freight Demand Management in the New York Metropolitan Area* (U.S. Department of Transportation, n.d.), http://www.transp.rpi.edu/~usdotp/DRAFT_FINAL_REPORT.pdf.
23. Tom Maguire, 2013 as cited in Holloway and Spahr, *Getting the Goods without the Bads*.
24. Ronald Achepohl 2013 as cited in Ibid.
25. City of Madison. *Public Accessibility to Municipal Data Sets*. 3.72, 2013. http://ccsnypd.org/html/doitt/downloads/pdf/nyc_open_data_tsm.pdf.
26. Joel Rogers and Satya Rhodes-Conway, *Cities at Work: Progressive Local Policies to Rebuild the Middle Class* (COWS, February 2014), <http://www.mayorsinnovation.org/pdf/CaWSummary.pdf>.
27. National Cooperative for Freight Research Program and Suzann S Rhodes, *Guidebook for Understanding Urban Goods Movement*, NCFRP 14 (Washington, D.C: Transportation Research Board, 2012).
28. Bruce Schaller, David Stein, and Manzell Blakeley, "Parking Pricing and Curbside Management in New York City," in *Transportation Research Board 90th Annual Meeting* (in Review), 2010, http://t2030.mtc.ca.gov/planning/smart_growth/parking/NYC_parking_pricing.pdf.
29. Bomar, Becker, and Stollof, *Urban Freight Case Studies: New York*.
30. Tom Maguire, 2013.
31. Greg Kamptner and Larry Davis, "Chapter 33 - Federal Laws Applicable to Railroads," in *The Albermarle County Land Use Law Handbook*, 2012, 33-1 to 33-33, <http://www.dot.state.mn.us/frac/PDF/landusereg.pdf>.
32. Rexford Sherman, *Seaport Governance in the United States and Canada* (Alexandria, VA: American Association of Port Authorities), accessed March 11, 2014, http://www.aapa-ports.org/files/PDFs/governance_uscan.pdf.
33. *Airport Governance and Ownership, Legal Research Digest*, Airport Cooperative Research Program (Washington, D.C: Transportation Research Board, August 2009), http://onlinepubs.trb.org/onlinepubs/acrp/acrp_lrd_007.pdf.
34. Port of Seattle, "ABC Fuels Flyer," July 2013, http://www.portseattle.org/Environmental/Air/Seaport-Air-Quality/Documents/201307_ABC_Flyer.pdf.
35. Ibid.
36. Ibid.
37. Committee on Construction, "Brooklyn-Port Authority Marine Terminal-Brooklyn Cruise Terminal - Shore Power Installation - Project Re-Authorization," July 28, 2012, <http://www.panynj.gov/corporate-information/pdf/bcp-062812-construction.pdf>.
38. "Shore Power Deal to Cut Fumes from Red Hook Cruise Ships Back on Track - NY Daily News," accessed January 16, 2014, <http://www.nydailynews.com/new-york/brooklyn/shore-power-deal-cut-fumes-red-hook-cruise-ships-back-track-article-1.1091106>.
39. The Port Authority of NY & NJ, *A Clean Air Strategy for The Port of New York & New Jersey*, October 21, 2009, <http://www.panynj.gov/about/pdf/CAS-FINAL.pdf>.
40. Ibid.
41. The Port of Long Beach, "Port of Long Beach, Clean Truck Program Factsheet," n.d., accessed November 21, 2013.
42. "The Port of Los Angeles | Clean Truck Program," accessed January 16, 2014, http://www.portoflosangeles.org/ctp/idx_ctp.asp.

43. Ibid.
44. Ibid.
45. Ibid.
46. Intermodal Association of North America (IANA), "Policy Issue Briefing: Employee Driver Mandates (Clean Truck Programs)," accessed November 21, 2013, <http://www.intermodal.org/information/issues/briefings/empldriver.pdf>.
47. PierPass, "PierPass OffPeak Schedule," PierPass OffPeak Schedule, accessed August 21, 2013, <http://pierpass.files.wordpress.com/2013/07/rollingschedule07-20-13.pdf>.
48. Paul Sherer, "Marine Terminal Operators at the Ports of Los Angeles and Long Beach to Adjust TMF on August 19," July 2, 2013, https://www.pierpass-tmf.org/Documents/TMF%20adjustment%202013%20release_7%202%2013_final.pdf.
49. Windes & McClaughry Accountancy Corporation, Pier Pass 2012 Financial Report, April 19, 2013, <https://www.pierpass-tmf.org/Documents/pierpass-2012-financial-report.pdf>.
50. Port of San Diego, "Vessel Speed Reduction Program," 2009, <http://www.mayorsinnovation.org/pdf/CitiesatWorkEM-BARGO.pdf>.
51. "City of Raleigh Unified Development Ordinance," accessed March 11, 2014, <http://www.raleighnc.gov/content/extra/Books/PlanDev/UnifiedDevelopmentOrdinance/index.html#/105/zoomed>.
52. Town of Morrisville, "Zoning Ordinance," June 2013, <http://www.ci.morrisville.nc.us/DocumentCenter/Home/View/1186>.
53. Raleigh-Durham International Airport, "RDU Aircraft Noise Program" <http://www.rduaircraftnoise.com/>
54. Federal Railroad Administration, "The Train Horn Rule and Quiet Zones" <http://www.fra.dot.gov/Page/P0104>
55. Michael Reich, Peter Hall, and Ken Jacobs, "Living Wages and Economic Performance: The San Francisco Airport Model" (Berkeley, California: Institute of Industrial Relations, 2003), available at http://www.irle.berkeley.edu/research/livingwage/sfo_mar03.pdf.
56. FindLaw, "Displaced Building Service Workers Act," available at: <http://codes.lp.findlaw.com/nycode/ADC/22/5/22-505> (last accessed July 2013).
57. America Legal Publishing Corporation, "Service Contractor Worker Retention," available at [http://www.amlegal.com/nxt/gateway.dll/California/laac/administrativecode/division10contracts/chapter1contractsgeneral?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:laac_ca\\$anc=JD_D10C1A10](http://www.amlegal.com/nxt/gateway.dll/California/laac/administrativecode/division10contracts/chapter1contractsgeneral?f=templates$fn=default.htm$3.0$vid=amlegal:laac_ca$anc=JD_D10C1A10) (last accessed July 2013).
58. America Legal Publishing Corporation, "Protection of Displaced Contract Workers," available at [http://www.amlegal.com/nxt/gateway.dll/Pennsylvania/philadelphia_pa/title9regulationofbusinessstradesandpro/chapter9-2300protectionofdisplacedcontra?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:philadelphia_pa](http://www.amlegal.com/nxt/gateway.dll/Pennsylvania/philadelphia_pa/title9regulationofbusinessstradesandpro/chapter9-2300protectionofdisplacedcontra?f=templates$fn=default.htm$3.0$vid=amlegal:philadelphia_pa) (last accessed July 2013).
59. America Legal Publishing Corporation, "Displaced Worker Protection," available at [http://www.amlegal.com/nxt/gateway.dll/California/police/article33cdisplacedworkerprotection?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:sanfrancisco_ca](http://www.amlegal.com/nxt/gateway.dll/California/police/article33cdisplacedworkerprotection?f=templates$fn=default.htm$3.0$vid=amlegal:sanfrancisco_ca) (last accessed July 2013).
60. St. Louis Public Library, "Displaced Building service workers Protection Ordinance," available at <http://www.slpl.lib.mo.us/cc/ords/data/ord7423.htm> (last accessed July 2013).
61. "Displaced Workers Protection", District of Columbia Official Code, Division V, Title 32, Chapter 1, available at: <http://law.justia.com/codes/district-of-columbia/2012/division-v/title-32/chapter-1/>.
62. Newark General Ordinances, VOLUME I, TITLE II: ADMINISTRATION, Chapter 4, Article 2, 4-22A, available at http://70.168.205.112/newark_nj/lpext.dll/Infobase/volume%20i/newark02.htm/t2_ch4.htm?fn=documentframe.htm&f=templates&2.0#LPTOC2.13.

About us

The Mayors Innovation Project is a learning network among American mayors committed to "high road" policy and governance: shared prosperity, environmental sustainability, and efficient democratic government. We are a project of COWS (Center on Wisconsin Strategy). This work is generously supported by the Surdna Foundation. We can be contacted at:

7122 Sewell Building
University of Wisconsin-Madison
Madison, WI 53706
(TEL) 608-262-5387

info@mayorsinnovation.org • www.mayorsinnovation.org • @mayorinnovation

