

Diesel Exhaust

COMMUNITY ACTION TO PROMOTE HEALTHY ENVIRONMENTS (CAPHE)

PROJECT PARTNERS:

Community Action Against Asthma

Community Member-at-Large
Theresa Landrum

Detroit Community-Academic Urban
Research Center

Detroit Health Department

Detroit Hispanic Development Corporation

Detroiters Working for Environmental Justice

Green Door Initiative

Healthy Environments Partnership

Michigan Department of Environment, Great Lakes, and Energy (EGLE)

Sierra Club

Southwest Detroit Environmental Vision

University of Michigan School of Public Health, Michigan Medicine, & Taubman College of Architecture and Urban Planning

University of Michigan-Dearborn

University of Detroit Mercy School of Law

CONTACT INFORMATION:

Alison E. Walding
Project Manager
walison@umich.edu
(734)764-2955
www.caphedetroit.sph.umich.edu



July 2020

WHAT IS DIESEL EXHAUST?

Diesel exhaust is an air pollutant created when diesel fuel is burned. It is a mixture of tiny particles and gases that includes fine particulate matter (PM_{2.5}), nitrogen oxides, organic and elemental carbon, benzene, nickel, and formaldehyde.¹ Diesel exhaust contributes to the formation of ozone (or "smog"), acid rain, and climate change.² The amount, composition and toxicity of diesel exhaust emitted from a diesel engine depends on the engine (including its age, type and condition), whether the engine has pollution control equipment (e.g., particle traps), fuel type and quality (e.g., the amount of sulfur), and the engine load (e.g., acceleration).³

WHERE DOES DIESEL EXHAUST COME FROM?

In Detroit, most diesel exhaust emissions come from "on-road" vehicles and "off-road" construction equipment powered by diesel engines. Figure 1 shows the major sources in Wayne County.

"On-road" emissions occur mostly on highways and major roads, and heavy-duty trucks are the largest emitters. Trucks crossing the Ambassador Bridge between Detroit and Windsor, Ontario are especially important since this is one of the busiest international commercial vehicle crossings in North America, with up to 13,000 trucks per day.⁴ Truck traffic at freight warehouses and railroad yards is also extensive.⁵ Trucks produce diesel exhaust emissions even while idling and queuing.

Diesel exhaust emissions from "off-road" sources are also important. Major sources include construction equipment, cranes/loaders, trains, and ships. The engines in these sources can be old and high emitting. Recent emission reduction regulations target older equipment, but the replacement or turnover of the fleet can be slow.

HOW DOES DIESEL EXHAUST AFFECT YOUR HEALTH?

An estimated 280 deaths and 380 heart attacks occur each year in Detroit from

- Eye, nose, throat, and lung irritation⁷
- Lightheadedness⁷
- Aggravation of bronchitis¹ and asthma^{1,7}
- Reduced growth of lungs⁸
- Chronic respiratory symptoms⁸
- Kidney damage⁹
- High blood pressure⁹
- Lung cancer^{7, 10}
- Heart attacks⁸

Diesel Emissions in Wayne County in tons/year

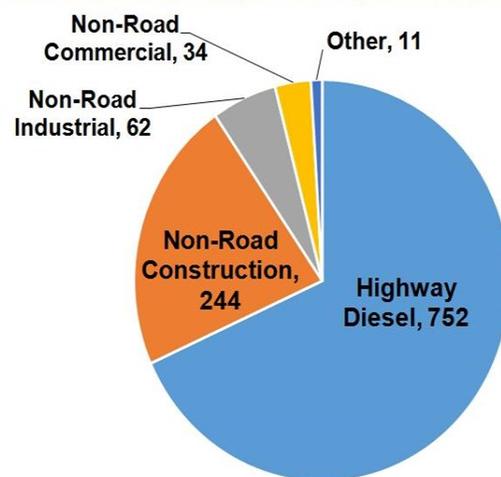


Figure 1: Emissions of diesel exhaust from major sources in Wayne County. National Emissions Inventory data, 2011.

Support was provided R01ES022616 from the National Institute of Environmental Health Sciences, National Institutes of Health, and the Fred A. and Barbara M. Erb Family Foundation. Additional support was provided by grant P30ES017885.

IS DETROIT'S AIR HEALTHY?

Diesel exhaust emissions are not directly monitored in outdoor air, and there is no ambient air quality air standard since diesel exhaust is a mixture of pollutants. However, diesel exhaust forms a part of fine particulate matter, called PM_{2.5}, which is monitored and regulated by the State of Michigan and the US Environmental Protection Agency. Diesel exhaust emissions comprise about 20% of PM_{2.5} at several Detroit monitoring sites, and a larger amount at "hot spots."¹¹ While Detroit meets the national standards for PM_{2.5}, reducing exposure to diesel exhaust remains a priority, particularly for exposed and susceptible individuals and near roadway "hot spots". (For more information, see CA-PHE's PM fact sheet).

WHO IS MOST LIKELY TO BE AFFECTED?

Residents living, working, or attending schools within about 100 yards of highways, railroad yards, freight warehouses, and other locations where diesel engines are used are likely to experience higher exposure to diesel exhaust emissions.⁸ This includes residents of Southwest Detroit, due to truck traffic from the Ambassador Bridge. People living near busy surface streets and freeways are also at risk.

Certain individuals are more susceptible to adverse health effects from diesel exhaust. Children are susceptible because their lungs are still developing, they breathe faster, have a lower body weight, and spend more time outdoors than adults.¹² Adults older than 65 years of age, and people with heart or lung disease, asthma, or other respiratory problems are also more sensitive.¹³

HOW TO REDUCE AND AVOID EXPOSURE TO DIESEL EXHAUST

- Enact stronger emission standards for diesel engines, and lower air quality standards near highways
- Modernize diesel buses, trucks, and locomotives, e.g., create and enforce engine rebuild/replacement requirements, and establish a Clean Truck Mitigation Fund¹⁴
- Maintain buses and trucks, and retrofit older vehicles with pollution control devices like particulate traps¹⁰
- Enforce Detroit's anti-idling ordinance^{10,14} and reroute trucks outside residential communities^{15, 16}
- Enact zoning and planning regulation that separates emission sources from people by requiring new homes, medical facilities, daycare centers, schools, and playgrounds to be 500 or more feet from highways and busy roads¹⁴
- Replace diesel engines at freight terminals with electrical motors
- Equip homes with air filters and upgrade furnace filters, to lower exposure to pollutants that enter homes¹⁷
- Use electrification programs at truck stops so truckers can power rigs overnight without running engines

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On a typical weekday, up to 13,000 trucks cross the Ambassador Bridge, which connects Detroit and Windsor, Ontario. This large volume of truck traffic is a major concern due to the diesel exhaust emitted while both driving on streets and idling at the Bridge terminal.

ABOUT COMMUNITY ACTION TO PROMOTE HEALTHY ENVIRONMENTS

CAPHE uses a community-based participatory research approach in which partners are involved in all phases of the work. This includes defining the research problem, designing and implementing the study, interpreting and distributing the results, deciding how results will be applied and applying the results to create a public health action plan to improve health in Detroit. CAPHE builds on 15 years of community-academic research partnerships. Members from these long-standing partnerships serve on CAPHE's Core Team, Steering Committee and Public Health Action Team. This structure promotes collaboration and shared decision making at all levels of the CAPHE project, ensuring Detroit residents will have a significant voice in identifying and creating solutions to Detroit's air pollution problems.