



Acknowledgements

CAPHE Core Team

Stuart Batterman and Amy Schulz, University of Michigan School of Public Health,
Co-Principal Investigators

Barbara Israel, University of Michigan School of Public Health

Toby Lewis, University of Michigan Medical School and School of Public Health

Evan Markarian, Southwest Detroit Environmental Vision

Angie Reyes, Detroit Hispanic Development Corporation

Guy Williams, Detroiters Working for Environmental Justice

CAPHE Steering Committee and Public Health Action Planning Team

Note: the CAPHE Steering Committee includes all Core Team Members listed above, as well as the following:

Rhonda Anderson, Sierra Club

Chris Dorle, Detroit Resident

J. Timothy Dvorch, University of Michigan School of Public Health

Larissa Larsen, University of Michigan's Taubman College of Architecture and Urban Planning

Jeremy Orr, Michigan Environmental Justice Coalition

Simone Sagovac, Southwest Detroit Community Benefits Coalition

Natalie Sampson, University of Michigan Dearborn College of Education, Health & Human Services

Nick Schroeck, Wayne State University Law School and the Transnational Law Center

Bob Sills, Michigan Department of Environmental Quality

Kathy Stott, Southwest Detroit Environmental Vision

Donele Wilkins, Green Door Initiative

Keisha Williams, Michigan Department of Environmental Quality

Staff

Kristina Rice, CAPHE Project Manager

Graciela Mentz, Data Analyst

Ricardo DeMajo, Data Manager and Geographical Information Systems (GIS) Specialist

Sharon Sand, Healthy Environments Partnership Project Manager

Carol Gray, Detroit Community Academic Research Center Project Manager

Wibke (Vee) Heymach, Detroiters' Working for Environmental Justice Program Coordinator

Mayra Rivas-Roche, Detroit Hispanic Development Corporation Youth Coordinator

Research Assistants

Manuel Avina, Hannah Gordon, Rachel Hackett, Katlyn Hogan, Sheena Martenies, Chad Milando,

Katie Moore, Andrea Picones, Lee Taylor-Penn, Melanie Ward, Rebecca Weiland, and Greg Wnuk

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Public Health Action Plan Executive Summary

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A Public Health Action Plan for Air Quality In Detroit

Detroit's legacy as the "arsenal of democracy" in the World Wars, the "motor city" throughout the 20th century, its major international crossing with Canada, and the many other notable features that have shaped the city and its population have led to the juxtaposition of heavy industry, housing and transportation corridors that expose city residents and workers to elevated levels of ambient air pollutants. Coupled with the greater vulnerability of many residents to air pollution, a result of poverty, limited access to health care, existing disease and other factors, rates of environmentally-related diseases are high in the city. The *CAPHE Public Health Action Plan* provides concrete steps to address these issues and improve health in Detroit and southeast Michigan. This executive summary highlights key elements of the scientifically-informed plan, which was developed using a multi-stakeholder and participatory process. The full plan and accompanying Resource Manual are available at <http://caphedetroit.sph.umich.edu/>.

The health impact from air pollution in Detroit is substantial. Air pollutants affecting health in Detroit include particulate matter (PM_{2.5}), diesel

exhaust, sulfur dioxide (SO₂), ozone (O₃), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and toxic metals like lead (Pb). Portions of Detroit do not meet the National Air Quality Standards (NAAQS) for SO₂, and the region will not meet the NAAQS for O₃. Exposure to PM_{2.5}, O₃ and other pollutants can cause health effects even at levels below the NAAQS, including asthma and asthma aggravation,^{1, 2} hospitalization visits and deaths due to cardiovascular and respiratory disease,^{3, 4} lost work and school days, cancer, and adverse birth outcomes.

The magnitude of the public health burden experienced by residents of Detroit and neighboring cities attributable to air pollution is shown in Table 1. Each year, air pollution causes 690 deaths, thousands of hospital visits, and many other adverse health effects among residents of Detroit and neighboring cities.⁵ The direct economic cost of these health impacts is estimated at \$6.9 billion dollars each year. The health burden attributable to ambient air pollution represents 7% of deaths in the city (out of approximately 9,500 each year), 1% of hospitalizations (out of more than 162,000 each year), and between 2 and 13% of days with asthma symptoms. Asthma is a special concern in Detroit, given its very high rates. (See asthma sidebar). Importantly, health impacts due to air pollution are preventable.

TABLE 1. Annual health burden attributable to ambient exposures to PM_{2.5}, O₃, SO₂ and NO₂. Exposure sources are "regional" sources representing pollution from neighboring areas, "point" sources representing local industry, "mobile" sources representing local trucks, cars and other on-road vehicles, and "area" sources representing smaller industrial sources, non-road mobile emissions, and other air pollutant sources. The table excludes cancer.⁵

Outcome (cases per year)	Age Group	Exposure Source				
		Regional	Point	Mobile	Area	Total ¹
Mortality	< 1, ≥ 30 years	560	20	30	9	690
Hospitalizations	All ages	1200	120	350	150	1800
Asthma ED visit	< 18 years	2600	160	450	170	3,400
Asthma symptom days	6 - 14 years	310,000	23,000	57,000	49,000	440,000
Restricted activity days ²	All ages	1,300,000	18,000	21,000	65,000	1,400,000
Total DALYs (years) ³		11,000	440	560	1,600	13,000
Monetized impact (\$million)		5,500	230	280	850	6,900

Notes 1. Impact estimates have been rounded to two significant figures

2. Includes minor restricted activity days, work loss days, and school absences.

3. DALYs are disability-adjusted life-years, representing equivalent years of life lost due to premature death and illness.

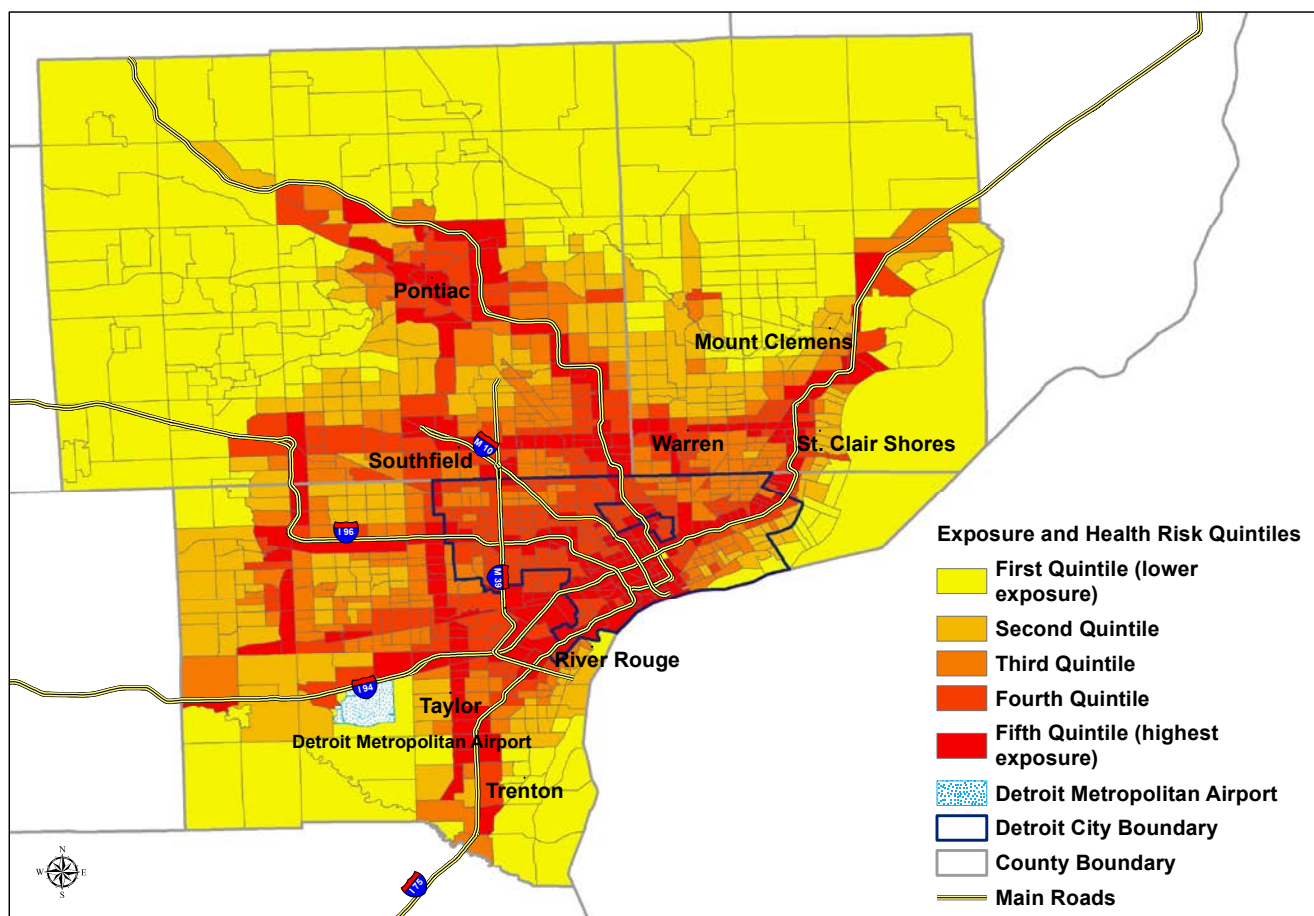
Asthma in Detroit

Asthma is linked to environmental exposures like poor air quality. Detroit has a much higher asthma burden than the State of Michigan overall. Using the most recent statistics⁶ and comparing Detroit to the state as a whole:

- Current asthma prevalence among Detroit adults is 29% higher
- Hospitalization rates for asthma are more than three times higher in Detroit
- Emergency department visits for children covered by Medicaid are twice as high in Detroit
- Children covered by Medicaid with persistent asthma in Detroit rely on emergency department 50% more.

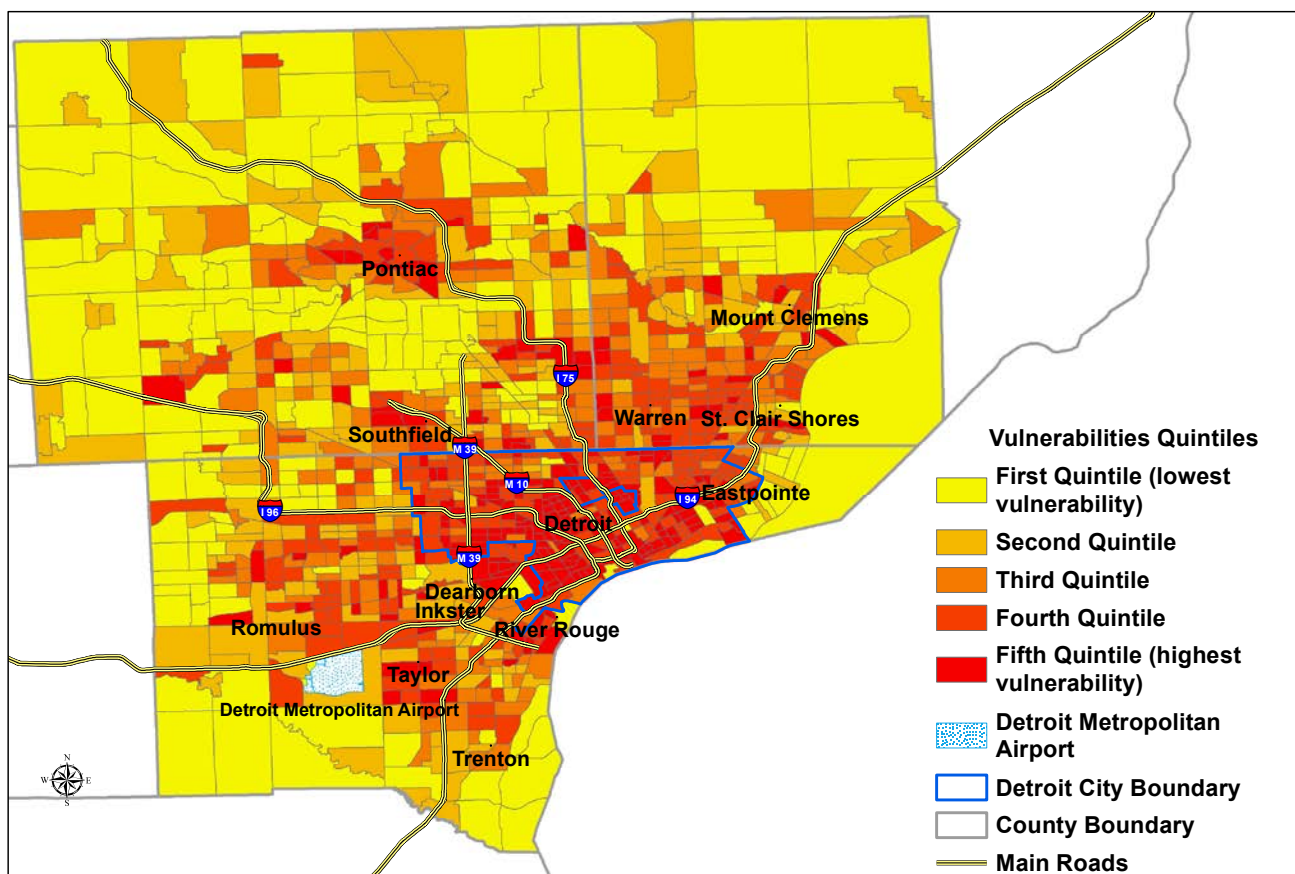
The impacts of poor air quality disproportionately fall on poor and minority populations. Figure 1 shows the distribution of diesel PM exposure and respiratory and cancer risks associated with air pollution in the Detroit metropolitan area. Residents of census tracts with the highest levels of exposure and associated risk (Quintiles 3-5) have a 12% greater chance of death due to cardiopulmonary (heart and lung) disease compared to those living in census tracts with the lowest exposures (Quintiles 1-2) after controlling for individual risk factors such as education and smoking. Approximately 260 deaths due to cardiopulmonary disease would be averted each year if census tracts with the highest levels of exposure (Quintiles 3-5, Figure 1) were reduced to levels currently found in low exposure census tracts (Quintiles 1-2).

FIGURE 1: Diesel PM exposure, cancer and respiratory risk attributable to air pollution in the Detroit metropolitan area.⁷



Cumulative impact polygons (CI) include: residential areas, child care facilities, health care facilities, schools and playgrounds. Exposure and Health risk include: 2011 NATA estimates of respiratory risk, cancer risk and diesel PM (non-cancer) concentration.

FIGURE 2: Population vulnerability, defined as percent below poverty, renters, low median home value, less than high school education, adults over age 60, and children below age 5, in the Detroit Metropolitan Area.⁷



Cumulative impact polygons (CI) include: residential areas, child care facilities, health care facilities, schools and playgrounds. Vulnerabilities includes: % below the national poverty level, % renters, median house value (reverse coded), % > age 24 with < high school completion, children age < 5, adults age >= 60, and linguistic isolation.

The census tracts in the Detroit metropolitan area with higher levels of air pollution are also more likely to be home to residents who are more vulnerable to adverse health effects associated with those exposures. Figure 2 shows the distribution of vulnerabilities (e.g., lower educational levels, incomes below the poverty line, people of color, children below the age of 5, adults over 60) across census tracts. The majority of deaths attributable to air pollution each year in the Detroit metropolitan area occur in census tracts with the highest levels of population vulnerability (Quintiles 3-5, Figure 2).

What Can We Do About Air Pollution?

Many approaches and interventions can be used to improve Detroit's air quality and improve public health. The **CAPHE Public Health Action Plan** contains a comprehensive

set of 10 strategies for achieving healthier air and 25 specific recommendations to reduce emissions, lower exposures, and improve public health. These range from simple, small-scale actions such as installing a better filter in a home's heating and air conditioning system, to large-scale policy solutions such as promoting low emission transportation alternatives and improving monitoring and enforcement of industrial facilities. The strategies fall into three types: (1) **lowering emissions** using emission controls, clean fuels, anti-idling and other actions applied to industrial and mobile sources; (2) **reducing exposure to air pollutants** using buffers and air filters to reduce the amount of pollution that people are exposed to; and (3) **improving enforcement and compliance** of existing air quality standards by bolstering monitoring and enforcement activities and increasing public understanding and engagement.

Implementing any of the strategies in the CAPHE Public Health Action Plan will help to improve air quality and public health. A coordinated approach that implements multiple strategies will be most effective and will benefit the most people. Some of the strategies are cost effective and will reduce air pollutants quickly – these include recommendations for anti-idling restrictions, clean fuels, and air filters. Other strategies will take more time to implement – such as transitioning to renewable energy, widespread use of vegetated buffers between pollution sources and people, and the development of environmentally sustainable and healthy mobility and transit options. All of our recommendations are based on scientific evidence summarized in [CAPHE's Public Health Action Planning Resource Manual](#), which have been reviewed by many contributors, and have been vetted through a thorough process that considered their appropriateness and feasibility for Detroit (See Acknowledgements for a listing of participants).

The strategies and recommendations described in CAPHE's Public Health Action Plan, when implemented, will substantially improve the health and well-being of Detroiters.

Structure of the Public Health Action Plan

The CAPHE Public Health Action Plan is organized into 10 chapters that address: (1) point source controls; (2) renewable energy; (3) diesel engine retrofits; (4) idling controls; (5) clean fuels; (6) transportation control measures; (7) indoor air filters; (8) buffers and barriers; (9) compliance and enforcement of air quality rules; and (10) monitoring. Each chapter includes a brief introduction and specific recommendations, including specific actions for implementation that cover: (1) **education and outreach** – intended to raise knowledge about air pollution, health effects, and effective strategies; (2) **support and coordination** – describing current and potential partnerships

to implement the strategy; (3) **incentives and funding** – listing funding and incentive opportunities for the strategy; and (4) **planning and regulations** – policy actions and regulatory changes that could be put in place to support the recommendation.



This *Executive Summary*, highlights only a subset of the implementation activities described in the full [CAPHE Public Health Action Plan](#). In addition, the full plan provides many examples of activities ongoing in Detroit and in other communities to improve air quality and public health.

The CAPHE Public Health Action Plan is supported by a comprehensive [Public Health Action Planning Resource Manual](#) that provides additional depth on the science and status of air quality in Detroit, as well as the approaches that can be used to improve air quality and public health. This *Resource Manual* provided the basis for the Plan and our recommendations.

MITIGATION STRATEGIES

Many strategies can be used to reduce air pollutant emissions and lower people's exposure to air pollutants (See side bar: "Top Ten Strategies"). The following summarize key elements of the ten strategies for healthy air included in the *CAPHE Public Health Action Plan*. The Plan provides full details on each strategy and recommendation, and includes suggestions and examples of how these can be implemented.

The "Top Ten" CAPHE Public Health Action Plan Strategies

1. **Point source controls** – control and reduce emissions at industrial facilities.
2. **Renewable energy** – replace fossil fuels with non-polluting solar and wind energy.
3. **Diesel engine retrofits** – fix or replace older and polluting diesel engines in buses and other equipment.
4. **Idling controls** – idling engines waste fuel and money and reducing idling reduces emissions.
5. **Clean fuels** – replace fossil fuels with cleaner fuels like biodiesel.
6. **Transportation control measures** – improve mobility to reduce congestion and emissions.
7. **Indoor air filters** – install filters in buildings to effectively reduce PM_{2.5} levels.
8. **Buffers and barriers** – separate schools, residences and other places from highways and industry.
9. **Enhanced compliance and enforcement of air quality rules** – enforce stricter laws to reform polluters.
10. **Enhanced ambient monitoring** – document pollution problems to raise awareness and identify solutions

HEALTHY AIR STRATEGY 1: Point Source Controls

Point source controls reduce the amount of pollutants emitted by industry, such as power plants, refineries, coke and steel facilities, incinerators and manufacturing plants. This reduces air pollution at its sources - before it reaches nearby communities. This is particularly important for Detroit, given its extensive industrial activity, many old and relatively "dirty" facilities that lack modern emissions controls, and the large and vulnerable populations who live near to these facilities. **Point source controls** reduce emissions by using cleaner fuels and processes, or by using scrubbers, filters and other equipment that clean pollutants from the air before it leaves the source. Controls can also reduce "fugitive emissions" from open storage piles and handling and transport operations. *Point Source Controls* includes three recommendations summarized below: Please see Chapter 1 for the full set of activities and examples.

RECOMMENDATION 1-1: Improve emissions controls and monitoring at point sources.

Emissions controls reduce the quantity of pollutants emitted, while "stack" (or source) monitoring ensures that the controls are working properly. Both are needed to ensure effective control. (Source monitoring differs from ambient air quality monitoring, which is described in Strategy 10.)

Activities to support this recommendation include: disseminating information about point source controls that show facility impacts; coordinating efforts with current and upcoming SO₂ and O₃ non-attainment plans; promoting cooperation between City and State departments; using Michigan's Air Pollution Control Facility Tax Exemption and allowing permit violation fines to support emissions reduction efforts; and adopting more stringent state and local regulations.

RECOMMENDATION 1-2:

Require quantitative and qualitative health impact assessments (HIAs) and equity assessments when developing air quality management strategies.

These assessments improve understanding of the true impacts of point sources, beyond current compliance-oriented reviews that do not fully account for health impacts.

Examples of activities to promote the use of HIAs include: sharing information and educating residents and decision makers about health impact assessments; coordinating state agencies, community groups, academic partners and others in conducting these assessments; creating funding mechanisms to enable the Michigan Department of Environmental Quality (MDEQ) to include HIAs in decision-making and permit reviews; and developing, vetting and implementing HIAs conducted by MDEQ.

RECOMMENDATION 1-3:

Improve safety and awareness of industrial facilities and air emissions.

Upsets, malfunctions, fires, explosions, emergency releases, and other types of accidents can occur with public health impacts.

Strategies to achieve greater safety and awareness include: providing emergency response education and information and improving worker training; collaborating between industry, government, trade organizations and others to improve safety; providing tax incentives for participation in safety training programs and imposing stricter penalties for repeated safety violations; and banning open storage and material transfer processes and increasing safety inspections.

As noted earlier, this Executive Summary collapses CAPHE's recommendations and strategies. Please see Chapter 1 of the CAPHE Public Health Action Plan for full set of implementation activities and many examples that pertain to point source controls.

Open storage piles can be sources of air pollutants. Emissions of particulate matter (PM) can be reduced using fences and wind screens, but full enclosure is needed to control PM, volatile organic compounds and odors.



Focus On Sulfur Dioxide

Point source controls can fix long-standing SO₂ pollution problem in Detroit

Coal is used to produce electricity, steel, lime and cement in Detroit. Unfortunately, none of the industrial facilities in the Detroit area that use coal employ point source controls like scrubbers to reduce the sulfur dioxide (SO₂) emissions that results from burning coal and coke. As a result, portions of Detroit do not meet the SO₂ National Ambient Air Quality Standard (NAAQS). Figure 3 shows nine major sources (each emitting over 100 tons per year) that contribute to SO₂ pollution in Detroit. Many additional but smaller point sources in the area also emit SO₂. The figure also shows the SO₂ non-attainment zone designated by MDEQ, where the NAAQS is exceeded.

SO₂ concentrations extend across the city, and are not limited to just in the non-attainment zone. Figure 4 shows the pattern of peak concentrations, based on dispersion modeling.

Exposure to SO₂ significantly affects health, especially in southwest Detroit. Figure 5 shows the risk due to SO₂ as disability-adjusted life years or DALYs, a summary measure of the health impact. Children are most susceptible to adverse health effects of this pollutant. In Detroit and downriver cities, exposure to current levels of SO₂ each year causes:

- 67 hospitalizations among children and adults for asthma and chronic obstructive pulmonary disease
- 95 to 110 visits of children to the emergency department for asthma attacks
- 6,100 to 26,000 cases of asthma exacerbation (repeated cough, inhaler use, etc.) among children, many of which result in school absences.

The adverse health impacts from SO₂ are preventable. Point source controls should be applied to reduce SO₂ emissions at the major point sources, and also at smaller sources that are close to neighborhoods.

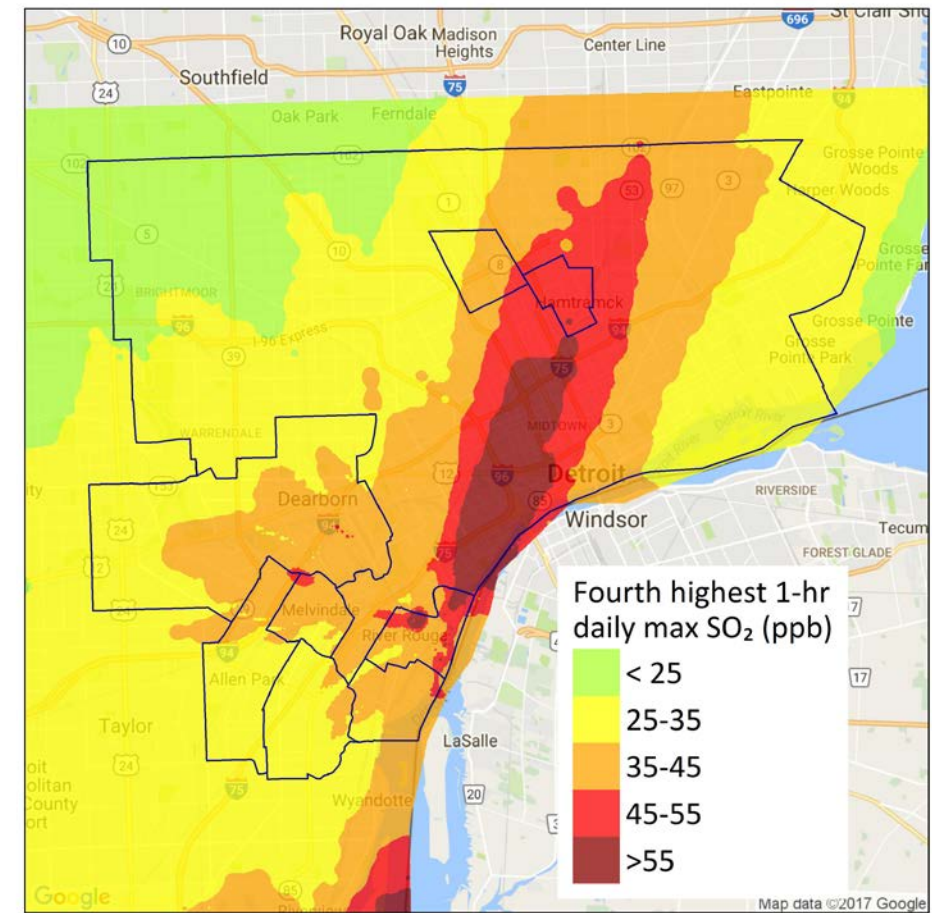


FIGURE 4. 4th highest 1-hr SO₂ concentrations in Detroit area based on dispersion modeling.

FIGURE 3. Boundaries of the SO₂ non-attainment area, and locations of major point sources of SO₂.

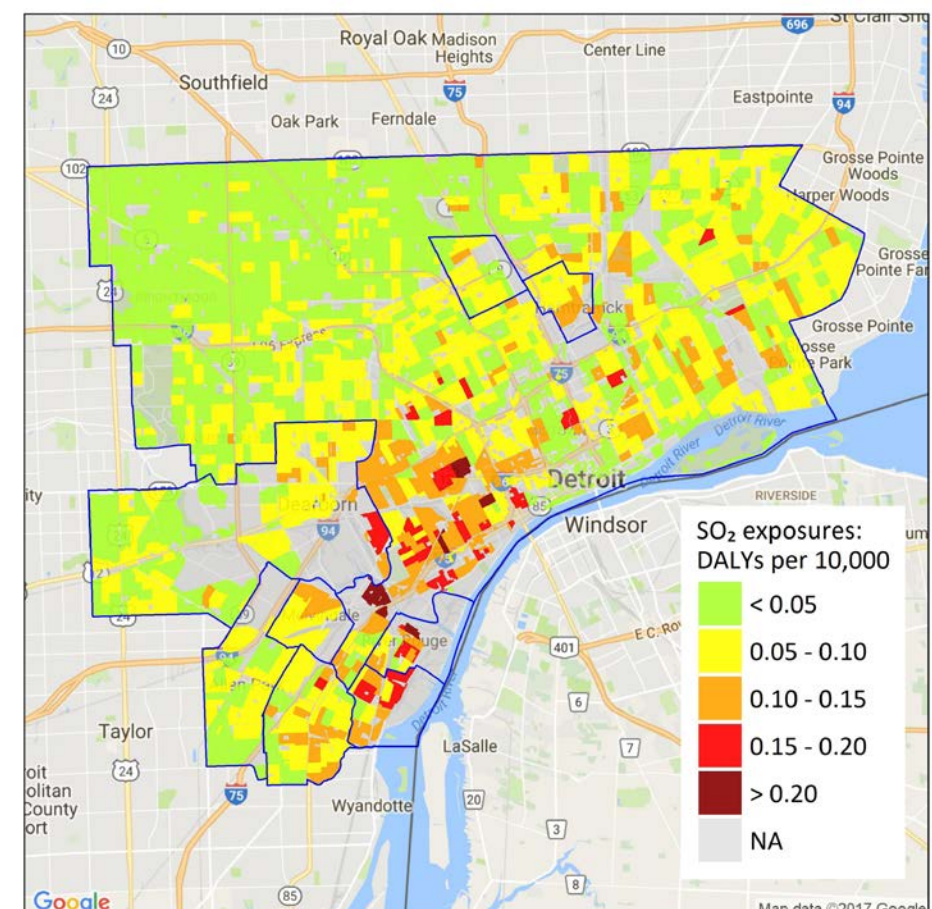
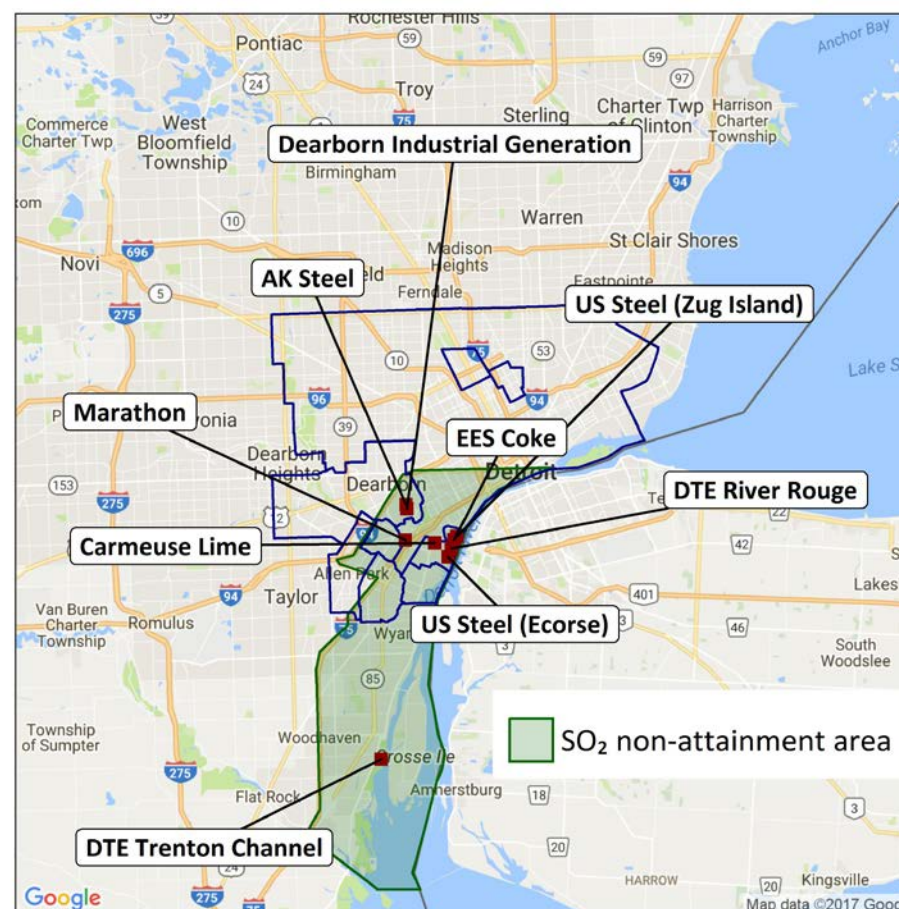


FIGURE 5. Health risk due to current levels of SO₂ in disability-adjusted life years (DALYs) per 10,000 residents.



View of Southwest Detroit showing trucking and industrial facilities adjacent to residential areas.

HEALTHY AIR STRATEGY 2: Renewable Energy

Renewable energy sources like solar, wind, geothermal, biomass⁸, and hydropower energy have low emissions and low environmental impacts.⁹ These sources can replace the energy and reduce the emissions associated with coal, petroleum and other fossil fuels.¹⁰ Renewable energy, especially wind and solar power, can transform the energy and physical landscape in Detroit and promote economic revitalization. Renewable Energy includes two recommendations summarized below. Please see Chapter 2 for the full set of activities and examples.

RECOMMENDATION 2-1: Increase the use of renewable energy sources and transition away from polluting sources.

Strategies to increase renewable energy include: launching a public awareness campaign and joining national campaigns that promote renewable energy; creating consumer education programs; promoting consumer owned electricity generation through energy co-ops; creating partnerships that develop local source of renewable energy; using existing renewable energy incentive and funding programs; and encouraging the City of Detroit to set aggressive renewable energy goals and to remove regulatory and financial barriers to renewable energy.

RECOMMENDATION 2-2:

Use renewable energy and green and sustainable practices for new and renovated buildings and infrastructure.

Buildings make large energy demands for heating, cooling and lighting, but they also present great opportunities to generate a large fraction of energy they use.

Strategies to encourage more efficient buildings include: conducting outreach and education on the economic and health benefits of renewable and green construction practices; creating partnerships and collaborations that expand use of renewable energy practices in new design and renovations; using federal, state and local incentive and funding programs to promote use of renewable energy; requiring or incentivizing all City-owned facilities and construction to implement green practices; and adopting a “Green Building Ordinance.”

HEALTHY AIR STRATEGY 3: Diesel Engine Retrofits

Retrofitting old diesel engines with effective emission controls and replacing old diesel engines can significantly reduce pollution. Emissions of pollutants including diesel exhaust $PM_{2.5}$, a cancer-causing pollutant, are greatly lowered by new technologies like oxidative catalysts and diesel particulate traps – technologies entirely lacking on diesel

engines in buses and trucks built before 2007. Retrofits can be used on trucks, school buses, construction vehicles (e.g. dump trucks, cranes), diesel-powered equipment (e.g. generators, pumps), ships and trains. Retrofits would particularly benefit the residents living near busy roads, children riding school buses (70% of DPS's bus fleet is diesel¹¹), and truck drivers. The *Diesel Engine Retrofit* recommendation is summarized below. Please see Chapter 3 for the full set of activities and examples.

RECOMMENDATION 3-1: **Expand diesel retrofit and fleet and engine replacement efforts.**

Strategies to promote diesel engine retrofits include: creating education and outreach materials for truck owner/operators, trucking businesses, industrial facilities and construction companies that explain why and how to reduce diesel emissions; developing regional and state level partnerships with the Michigan Department of Environmental Quality, Michigan Department of Transportation, U.S. EPA SmartWay Transport, Southeast Michigan Council of Governments, city governments and others to promote current programs, advocate for additional funding, and develop new initiatives; using federal and state funds for retrofit and replacement programs, including the VW settlement funds; increasing the state match for Diesel Emission Reduction Act funds to obtain additional federal-level incentive funding; and enacting a state law requiring heavy duty vehicles contracted in Michigan using governmental funds to be equipped with modern pollution control devices.

HEALTHY AIR STRATEGY 4: **Idling Controls**

Idling controls reduce emissions by turning off the engine when a vehicle is not in motion. This is accomplished using anti-idling technology, and by operator compliance with policies and ordinances. Given the amount of time idling occurs, idling controls are especially important for truck drivers, residents living near freeways,

customs plazas, bridges and intermodal facilities, and children waiting for school buses. *Idling Controls* includes three recommendations summarized below. Please see Chapter 4 for the full set of activities and examples.

RECOMMENDATION 4-1: **Increase awareness of existing anti-idling efforts through an education and outreach campaign.**

Actions relevant to this recommendation include: creating and implementing an integrated city-wide education and outreach campaign to build awareness and commitment to anti-idling efforts; posting anti-idling signs in idling "hot spots" and increasing anti-idling signage in these areas; supporting and coordinating activities among organizations working on anti-idling campaigns in Detroit; and using the U.S. Department of Energy's Idle Box Toolkit.



The Dequindre Cut is a below grade pathway in the east-side of Detroit that provides safe and healthy options for walking and cycling.

RECOMMENDATION 4-2: **Increase enforcement of existing anti-idling ordinances.**

Enforcement of ordinances is necessary to attain anti-idling goals. Relevant activities include: providing outreach and education to the Detroit Police Department; organizing and conducting community surveys that identify idling hotspots, working with nearby cities and other organizations to pass anti-idling ordinances; and partnering with other organizations to develop state-level anti-idling restrictions.

RECOMMENDATION 4-3:

Encourage and incentivize trucking, delivery and bus companies and their drivers to minimize idling.

Many actions can help promote companies, schools and drivers to minimize their idling, including: using the EPA's outreach materials to increase awareness of SmartWay Partnerships among trucking companies and drivers; at Detroit schools, increase awareness among school officials, bus drivers, and parents and create no-car zones to reduce exposures during school pick-up and drop-off periods; partnering with industry, trucking unions, and transit to create new and innovative models to reduce idling; providing drivers' lounges at terminals and idling hotspots; and using automated management systems at custom stations at border crossings to facilitate traffic flow and minimize backups.

HEALTHY AIR STRATEGY 5: Clean Fuels

Clean fuels can replace conventional fuels (e.g., gasoline and diesel) in cars, trucks, construction equipment, and other motorized vehicles and portable equipment such as generators, lawn mowers and leaf blowers. **Clean fuels include most types of ethanol, biodiesel, natural gas, biogas, electricity, propane and hydrogen. These fuels produce less pollution throughout their life cycle (from production through use and disposal) than conventional petroleum fuels like gasoline and diesel.** Some clean fuels can be substituted directly; others require special equipment or retrofits. *Clean Fuels* includes two recommendations summarized below. Please see Chapter 5 for the full set of activities and examples.

RECOMMENDATION 5-1:

Increase use of the clean fuels best suited for Detroit and Michigan by (1) increasing use of clean fuels in vehicles (e.g., cars, buses, trucks, ships), construction equipment and industry; (2) converting transit vehicles operated by DDOT, SMART, QLINE and schools to clean fuels; and (3) improving the electric vehicle and clean fuels infrastructure.

Selected activities to implement this recommendation include: creating education and outreach programs to inform industry, small businesses, municipalities and citizens about clean fuel benefits; developing and implementing incentive programs to encourage use of zero-emission vehicles; incentivizing companies to operate clean fuel vehicles and equipment in Detroit's contracting and Request for Proposal system; creating tax incentives for individuals, businesses and truck fleet owners to use clean fuels; utilizing state and federal grants to support clean fuels and fleet upgrades; and requiring the use of clean fuels and/or fuel-efficient vehicles in all City contracts.

RECOMMENDATION 5-2:

Increase local production of second generation clean fuels, particularly advanced biofuels and biodiesel from waste oil.

Locally-produced clean fuels can help reduce emissions associated with transporting fuels, increase availability of clean fuels, provide employment, positively impact the local economy, and recycle waste materials. Local production facilities should utilize second generation biofuels (made from feedstocks

Clean fuels can replace conventional fuels (e.g., gasoline and diesel) in cars, trucks, construction equipment, other motorized vehicles and portable equipment, such as generators, lawn mowers and leaf blowers.

other than food crops), employ equipment and practices that minimize pollutant emissions, be sited appropriately, and produce high quality fuel with minimal emissions and odor.

Activities to increase biofuel production include: partnering between local educational institutions and the City of Detroit to develop educational programs, courses, workshops, and certificates in clean fuel production; creating biodiesel cooperatives to facilitate waste grease pick-up and biofuel production; using available incentive and funding mechanisms to build infrastructure and capacity; and revising regulations to make local production more feasible and economically and environmentally sustainable.

HEALTHY AIR STRATEGY 6: Transportation Control Measures

Transit and transportation control measures (TCMs) reduce vehicle-miles-travelled, make travel more efficient by managing and improving the transportation system, and encourage non-motorized alternatives. Steps include expanding public transit, facilitating traffic flow, and improving capacity of existing roads to reduce congestion.¹² TCMs in the Detroit should receive increased attention in the near future due to the likely designation of O₃ non-attainment in the

Detroit area, and because O₃ strategies require a regional effort. Transportation Control Measures includes three recommendations summarized below. Please see Chapter 6 for the full set of activities and examples.

RECOMMENDATION 6-1: Increase public transit ridership by improving regional transit systems and incentivizing their use across southeast Michigan.

Selected activities to promote ridership include: creating outreach to encourage Detroit and nearby communities to create a better integrated and more efficient regional public transit system; encouraging residents to use the public transportation system; providing free internet wireless on buses; releasing public transit data to the public that enables third-party developers to create commercial and social good products; using incentives to increase ridership on public transit like “fare-free” days each month; and integrating transit plans and promoting a regional public transit system.

RECOMMENDATION 6-2: Encourage higher vehicle occupancy, increase existing road capacity where needed, and improve traffic flow.

Achieving this recommendation will require a

In 2015 AK Steel agreed to install air filters in the Salina Elementary and Salina Intermediate Schools as part of their negotiated Supplemental Environmental Project (SEP).



diversity of actions, and suggestions include: creating and distributing a ‘best practices’ handbook of employer-based commuter incentive programs to increase awareness of potential options; creating educational materials and outreach to residents interested in improving health and reducing air pollution; coordinating with the Michigan Department of Transportation to implement high occupancy vehicle (HOV) and high occupancy toll (HOT) lanes; encouraging companies to offer incentives for alternative transit; and creating a citywide alternative commuter incentive program.

RECOMMENDATION 6-3:
Encourage active transit (walking and cycling) and mixed-use (“20-minute”) neighborhoods by improving planning and the built environment.

Some actions to encourage active transit include: conducting education and outreach to community residents and local decision makers to understand the need for, and the benefits of, public transportation, biking, and walking; using the “complete streets” design principles that combine TCMs, “smart growth” strategies, and design elements like road diets, refuge islands and curb extensions; developing multi-modal transportation systems that increase transportation options and create incentives for using alternative transit forms, including cycling, walking and public transit; creating a coordinated transportation improvement program partnership between Michigan Department of Transportation, Detroit Department of Transportation, Detroit Planning Commission, Southeast Michigan Council of Governments, the City of Detroit and others; and reallocating federal transportation funding for non-highway projects.

Enhanced filters are much more effective than standard furnace filters and can be installed in a building’s heating, ventilating and air conditioning (HVAC) system; filters are also available as stand-alone units.

HEALTHY AIR STRATEGY 7:
Indoor Air Filters

Air filters or purifiers in buildings remove particulate air pollutants, including PM_{2.5}, dust, small particles, pollen, allergens, animal dander, and fibers. Enhanced filters are much more effective than standard furnace filters and can be installed in a building’s heating, ventilating and air conditioning (HVAC) system; filters are also available as stand-alone (free-standing) units. Some filters can remove gases such as SO₂ and volatile organic compounds, though these are uncommon and expensive. When designed and used appropriately, air filters can be economical and effective, especially since people spend most of their time indoors¹³ and since filters reduce exposure to

both indoor sources of air pollution (e.g., cooking, smoking, vacuuming) and outdoor pollution. *Indoor Air Filters* includes two recommendations summarized below. Please see Chapter 7 for the full set of activities and examples.

RECOMMENDATION 7-1:
Install, use and maintain enhanced filters in schools.

Schools are especially important since children represent a vulnerable population, many schools are near major roads, and filters can be easily and inexpensively installed in most schools’ HVAC systems.

Activities to help schools use enhanced filters, especially schools located near major roads and industry, include: using a city-wide campaign to increase awareness about filter use and the linkage to academic achievement; creating school-community partnerships to coordinate air-quality improvement efforts; developing incentive programs to encourage appropriate

filter use and change-out (e.g., quarterly); and enacting laws and policies requiring filters and preventative maintenance in schools.

RECOMMENDATION 7-2:

Use filters in homes and businesses.

Activities to encourage residents and businesses to use filters include: promoting use of filters in homes and businesses through programs conducted by community organizations, city-wide campaign, telephone hotline or website; supporting and coordinating with current programming like Michigan's Weatherization Assistance Program, the Green and Healthy Homes Initiative, and Wayne Children's Healthcare Access Program; providing tax deductions for filters as a medical expense (e.g., reductions in asthma symptoms and hospitalization); creating tax credit exemptions for energy efficient and green buildings with enhanced filters; and requiring enhanced filters in public housing.

HEALTHY AIR STRATEGY 8: Buffers and Barriers

Buffers and barriers are setbacks, strips of land, vegetation and physical barriers (such as sound walls) that are located between sources of pollution (such as heavily trafficked roadways and industrial emissions sources) and sensitive land uses (such as residential areas, schools, day care centers, health care facilities and areas with high level of cumulative risk). Buffers reduce exposure to pollutants by absorbing, blocking or diluting some of the pollution, thus lowering concentrations. Buffers can help to reduce concentrations of O₃, PM, NO_x, SO₂, and CO,¹⁴ especially at residences and schools near highways or industrial facilities. Buffers also can have important co-benefits, providing opportunities to improve surface water management, form linear parks with walking and bicycling paths, and reduce noise levels. *Buffers and Barriers* includes three recommendations summarized below. Please see Chapter 8 for the full set of activities and examples.

RECOMMENDATION 8-1:

Adopt regulations to create consistent and appropriate minimum setbacks between sensitive land uses and pollution sources.

Activities to promote adoption of setback regulations include: increasing knowledge and awareness of the benefits of buffers and setbacks around pollution sources; incorporating buffers in Community Benefits Agreements related to point or mobile pollution sources; forming partnerships between Detroit-based groups working to reduce air pollution to promote buffers; and using tax credits, financial incentives, incentive zoning and density bonuses to encourage developers to use buffers.

RECOMMENDATION 8-2:

Plant vegetative buffers and/or install sound walls where current minimum setbacks are not met.

Selected activities to implement this recommendation include: increasing knowledge and awareness of the benefits of vegetative buffers and sound walls; using CAPHE's *Vegetative Buffer Guide* for tree planting information; partnering with groups currently working with buffers; coordinating with the Michigan Department of Transportation to encourage use of vegetative buffers along major roads; using tax deferrals, tax credits and development incentive programs to create revenue for buffers; and requiring buffers between pollution emitting sources and sensitive land uses in the City of Detroit zoning code.

RECOMMENDATION 8-3:

Increase tree canopy throughout the City of Detroit.

Selected implementation activities include: increasing knowledge and awareness about the role of trees in absorbing pollutants; identifying high priority areas where trees would be most beneficial; engaging Detroit residents, schools, businesses and policy makers in tree planting efforts; using local and state funding sources to support planting trees; and integrating tree



Allen Park air quality monitoring site.

plant programs into a comprehensive open space plan.

HEALTHY AIR STRATEGY 9: Enhanced Compliance and Enforcement of Air Quality Rules

Federal, state and regional and local regulations play critical roles in air quality management. Most notably, these include: MDEQ's construction and operating permits that may include limits on emissions and requirements on the facility, process, fuel and/or feedstock to limit emissions and comply with ambient air quality standards and guidelines; reporting, disclosure and emergency planning requirements; and MDEQ's inspection, monitoring, analysis, and assistance programs. *Enhanced Compliance and Enforcement* includes three recommendations summarized below. Please see Chapter 9 for the full set of activities and examples.

RECOMMENDATION 9-1: Increase the coverage, transparency, timeliness and stringency of facility inspections and enforcement activities, and assure compliance with existing permits and regulations.

This recommendation has many elements. Examples include: improving emissions inventory data and providing enhanced publically available databases; coordinating among MDEQ, the Michigan Attorney General's

Office, and the US Department of Justice to provide annual reports/updates for the public regarding compliance and enforcement activities; increasing the capacity of and funding for MDEQ by revising Act 451, increasing funds through state budget, increasing fees for Renewable Operating Permits (ROPs), and instituting fees for Permit to Install applications; increasing fines; establishing priorities for inspection programs that focus on areas of high environmental burden or cumulative health impacts; setting goals for timely enforcement; and tracking actions related to compliance and enforcement on an expanded website.

RECOMMENDATION 9-2:

Require the use of qualitative and quantitative health impact assessments (HIAs) and cumulative impact assessments as part of the air quality management process, including enforcement actions, SIP development, and permitting.

HIAs are important because they refocus air quality management activities from being compliance-oriented to health-oriented. HIAs provide a more comprehensive and realistic assessment of health impacts than the screening approaches currently used by MDEQ, e.g., they better account for vulnerability and susceptibility factors described earlier.

Selected actions here, mostly addressed to MDEQ, include: educating MDEQ personnel and other stakeholders on the development and use of HIAs; coordinating across state agencies, non-governmental organizations, community groups, and potentially academic partners for the effective use of HIAs in air quality management; exploring opportunities to reduce costs; partnering with MDHHS, local health departments, SEMCOG, the Centers for Disease Control and Prevention (CDC), and EPA; and developing vetting and implementing a HIA program to assess health, vulnerability, susceptibility and inequality impacts across the air quality program.

Mobile and transportable air quality monitoring can provide opportunities to increase spatial coverage, provide mapping, increase the monitored parameters, and respond to possible hot-spots and community concerns.

RECOMMENDATION 9-3:
Increase public input in air quality management, including the development of regulations, permitting, and enforcement activities.

Actions to increase public input and engagement include: publicizing MDEQ's toll-free telephone number (800-662-9278), website and other mechanisms to report air pollution problems; creating opportunities for ongoing and bi-directional communication with representatives from affected communities; partnering between MDEQ, community and non-governmental organizations in affected areas; adopting policies that more heavily weight community feedback, health impacts and cumulative impacts in air quality management decisions; providing earlier notice of pending actions; and using evaluation tools and ongoing improvement processes to improve public participation.

HEALTHY AIR STRATEGY 10:
Enhanced Air Quality Monitoring

Air quality monitoring measures the concentration of pollutants in outdoor air in order to understand concentrations, exposures and health impacts. In addition, air quality monitoring determines compliance with ambient air quality standards, and monitoring can help identify culpable (or contributing) emission sources that require mitigation. Monitoring forms an essential element of air quality management, and provides the best data for community members to know what is in the air they breathe as well as track trends, assess the adequacy of controls, and evaluate the performance of the overall air

quality management strategy. The Michigan Department of Environmental Quality (MDEQ) conducts most of the monitoring in the Detroit area, although several monitoring sites are operated by Marathon and other industries. The recent emergence of low cost air quality monitors provides opportunities for communities to actively monitor air quality themselves. *Enhanced Air Quality Monitoring* includes three recommendations summarized below. Please see Chapter 10 for the full set of activities and examples.

RECOMMENDATION 10-1:
Increase the number of monitoring sites, and utilize mobile and transportable monitors.

Currently, most monitoring is performed at permanent sites; mobile and transportable monitors provide opportunities to increase spatial coverage, provide mapping, increase the monitored parameters, and respond to possible "hot-spots" and community concerns.

Selected activities to help implement this recommendation include: creating educational opportunities for communities to learn about air monitoring technologies and monitoring sites; providing more opportunities for public engagement on air quality monitoring siting decisions by MDEQ; encouraging MDEQ and industry to collaborate and expand monitoring networks; expanding industry-operated monitoring to include fence-line, real-time, and multi-pollutant monitoring; expanding monitoring requirements as part of permit conditions; maintaining and ideally expanding financing of MDEQ's air quality monitoring program in Detroit.

RECOMMENDATION 10-2: **Identify and implement targeted air quality monitoring projects**

Targeted projects are needed to investigate exposures, air quality trends, health risks, pollutant hot-spots, fugitive emissions, source apportionment, monitoring system adequacy, efficacy of controls, epidemiology, health impact analyses, health interventions, and/or other public health concerns.

Currently, air quality monitoring and data analyses performed by MDEQ are primarily oriented toward assuring compliance with standards and evaluating trends. These should continue. This recommendation call for, in addition, targeted air quality monitoring projects that address public health and community concerns. Two key and topical examples include traffic-related air pollutants, especially diesel exhaust, associated with the new international bridge crossing and freeway expansions (I-75 and I-94), and lead and asbestos exposures from Detroit's large scale demolition program, which has an unprecedented target of 5,000 buildings in 2017 alone.

The recommended targeted strategies can be supported by: creating a structured and scientifically-sound process with public engagement to identify and prioritize potential focal projects; incorporating advisory boards or steering committees that include the public, researchers, industry and government representatives; involving city, county, state and national organizations as well as community-based organizations, universities, industry and labor in monitoring and interpreting the targeted projects; and obtaining support for monitoring projects from government, foundations, and industry.

RECOMMENDATION 10-3: **Increase public engagement with air quality monitoring activities.**

Selected activities to increase public engagement include: creating educational

materials and workshops to share information about the need for and use of air quality monitoring (e.g., explaining how monitoring works and interpreting monitoring results); creating meaningful, bi-directional, and open communication between residents, community-based organizations, industry and regulators; increasing collaborations among regulatory agencies, community residents and organizations to build capacity and to enhance the quality and relevance of air quality monitoring data; and enhancing access to an understanding of monitoring data.

AN ONGOING PROCESS

Challenges and Opportunities

Multiple social, economic and political factors will affect progress towards CAPHE's recommendations to improve air quality and public health. The new administration in Washington has removed the Clean Power Plan rules that would have accelerated the shuttering of polluting coal-fired power plants, including several facilities that affect air quality in Detroit. The U.S. Environmental Protection Agency is facing substantial cuts in funding which, if realized, will adversely impact enforcement of the Clean Air Act, air quality monitoring programs, some MDEQ programs, and other important air quality activities. In November 2016, a proposal for a Regional Transit Authority was voted down by two of the four participating counties in southeast Michigan, delaying the coordination and expansion of transit options. Freeway and bridge expansion are proceeding without updated environmental impact assessments and with restricted public engagement. Disparities in health, housing, education and economics in Detroit, while evolving, remain very troubling for the majority of Detroit residents. Finally, air quality management has elements that are technical, complex and possibly obscure to many, creating challenges to effective public participation.

Despite these challenges, there have been positive developments that support efforts to improve air quality in the City of Detroit. The recent settlement with Volkswagen for violations of emissions controls in their vehicles will bring a substantial infusion of funds to Michigan, which should be used to mitigate diesel exhaust emissions. Environmental activities in the City of Detroit, with its new Office of Sustainability, and in the State of Michigan are receiving greater attention from government and increased visibility in the media due, in part, to the Flint disaster. Downtown and midtown areas of Detroit are undergoing a resurgence, with new developments and an increase in population. The nearly complete M1-rail project along a portion of Woodward Avenue will demonstrate transit's potential. These and other existing initiatives can improve air quality and public health, and build momentum toward the longer-range goal of a more sustainable and healthier Detroit.

Development of the *CAPHE Public Health Action Plan* has brought together an influential group of organizations committed to improving air quality. Continued education and outreach efforts by this group and others will increase public engagement and expand knowledge of the substantial health concerns associated with air pollution in Detroit, as well as practical and feasible actions that can be taken to improve

air quality and health in the Detroit area. **Thus, the *CAPHE Public Health Action Plan* can help accelerate the transition to a cleaner and healthier Detroit.**

Next Steps

Following the launch of the *Public Health Action Plan* in 2017, CAPHE will work to support and encourage implementation of recommendations included in the plan. Many of these will be undertaken with leadership from a strong and committed core of Detroit- and Michigan-based organizations working to improve air quality and public health. Support from the CAPHE team for these activities will include:

Community meetings, town halls, and forums to share recommendations included in the *CAPHE Public Health Action Plan*.

These forums will bring together community organizations, institutions, and residents to share information about air pollution emissions, exposures, adverse health effects, and elements of the Public Health Action Plan. These forums will promote environmental health literacy, increase capacity to improve air quality and reduce adverse health effects, and encourage dialogue and coordinated action among community groups and institutions to promote improved air quality and public health.



Zug Island is a heavily industrialized island bordering Detroit with extensive air pollution sources, due to iron, steel and coke production.

Policy Advocacy Trainings.

CAPHE will be working with community groups and organizations to sponsor a series of community trainings designed to strengthen capacity of community organizations and residents to engage effectively with administrative and elected decision makers to promote clean air and public health. These trainings, which will be held in 2017 and 2018, will focus on improving effective engagement of community residents and organizations in decision making processes related to air quality. These trainings will incorporate a focus on policy recommendations included in the CAPHE Public Health Action Plan, including local (e.g. municipal), regional, state and federal level policies.

Youth Engagement and Capacity Building.

With leadership from CAPHE partner Detroit Hispanic Development Corporation, youth will be actively engaged in implementation of components of the *CAPHE Public Health Action Plan*, including raising awareness about air pollutants in the city, their implications for public health, and actions that can be taken to address these issues. A major objective of this effort is to strengthen capacity among local youth to be actively engaged in decisions that affect the environment and public health in Detroit.

Mini Grant Program.

CAPHE will implement a mini-grant program in 2017 and 2018 that will provide financial support for actions undertaken by Detroit residents and community groups that are consistent with recommendations included in the *CAPHE Public Health Action Plan*. Many of the recommendations included in the plan are actions that can be taken by local actors, and the mini-grants are designed to

provide support for such actions. Examples include planting vegetative buffers between residential areas and heavily trafficked roadways, developing anti-idling campaigns, or installing filters in schools in areas with high levels of ambient air pollutants. The competitive mini-grant program will be launched in May 2017. Application materials, review criteria, and timeline are available on the CAPHE website at www.caphedetroit.sph.umich.edu.

Continued Partnership to Support Action.

CAPHE and its member organizations will continue to be actively engaged in ongoing efforts in Detroit and Michigan, including the Detroit Environmental Agenda, the Michigan Environmental Justice Coalition, MI Air MI Health, and other efforts to promote clean air, with a particular focus on vulnerable populations who experience high levels of exposure.

Resources to Support Action.

There are a number of resources available on the [CAPHE website](#) to support action to implement the recommendations included in the CAPHE Public Health Action Plan. These include: [Fact Sheets](#) about air pollutants and their impacts on health in Detroit; information about [Indoor Air Filters](#); a [Vegetative Buffer Guide](#) that provides tips for designing and planting vegetative buffers; a [Buffer Audit](#) that evaluates state and local laws related to creation of buffers in Detroit; links to resources such as *EPA's AirNow*, providing up to date information about air quality across the state; and other resources for understanding air pollution in the Detroit metropolitan area and for reducing exposures and their adverse health effects. Please check the website regularly, as it is continuously updated with new materials.

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- ⁵ These preliminary results are based on an analysis for Detroit and several neighboring cities. It uses health impact functions to predict the number of attributable cases of mortality and morbidity due to pollutant exposures. Exposures to PM_{2.5}, O₃, SO₂, and NO₂ are based on monitoring data and dispersion model predictions and are estimated at the census block level. Baseline incidence rates of mortality and hospitalizations use 5-year data for Wayne County (2009-2013) summarized at the ZIP code level. Other health outcome rates are at the county level or national level when county-level rates are not available. Concentration-response coefficients are drawn from existing epidemiological studies, and population data are taken from the US Census. We do not consider thresholds in exposure for any of the included pollutants, consistent with US EPA determinations that there is no evidence of a population-level threshold. Thus, these estimates represent the burden of disease due to total exposures of the pollutants. These results are described in: Martenies SE, Williams GO, and Batterman, SA. 2017. Assessing the health impacts and health burden inequality of ambient air pollution in Detroit, MI. Manuscript in preparation.
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