

Lung Health and Outdoor Air Quality

Kindra Weid, RN, BSN, MPH

Coalition Coordinator MI Air MI Health and *It's Electric!*

Lung health and outdoor air quality - 2

Disclosures:

I receive funding as an air quality advocate from Moms Clean Air Force and Michigan Environmental Council to work on electric school bus advocacy in Michigan.

Their work is funded through the Environmental Defense Fund and World Resources Institute, respectively.



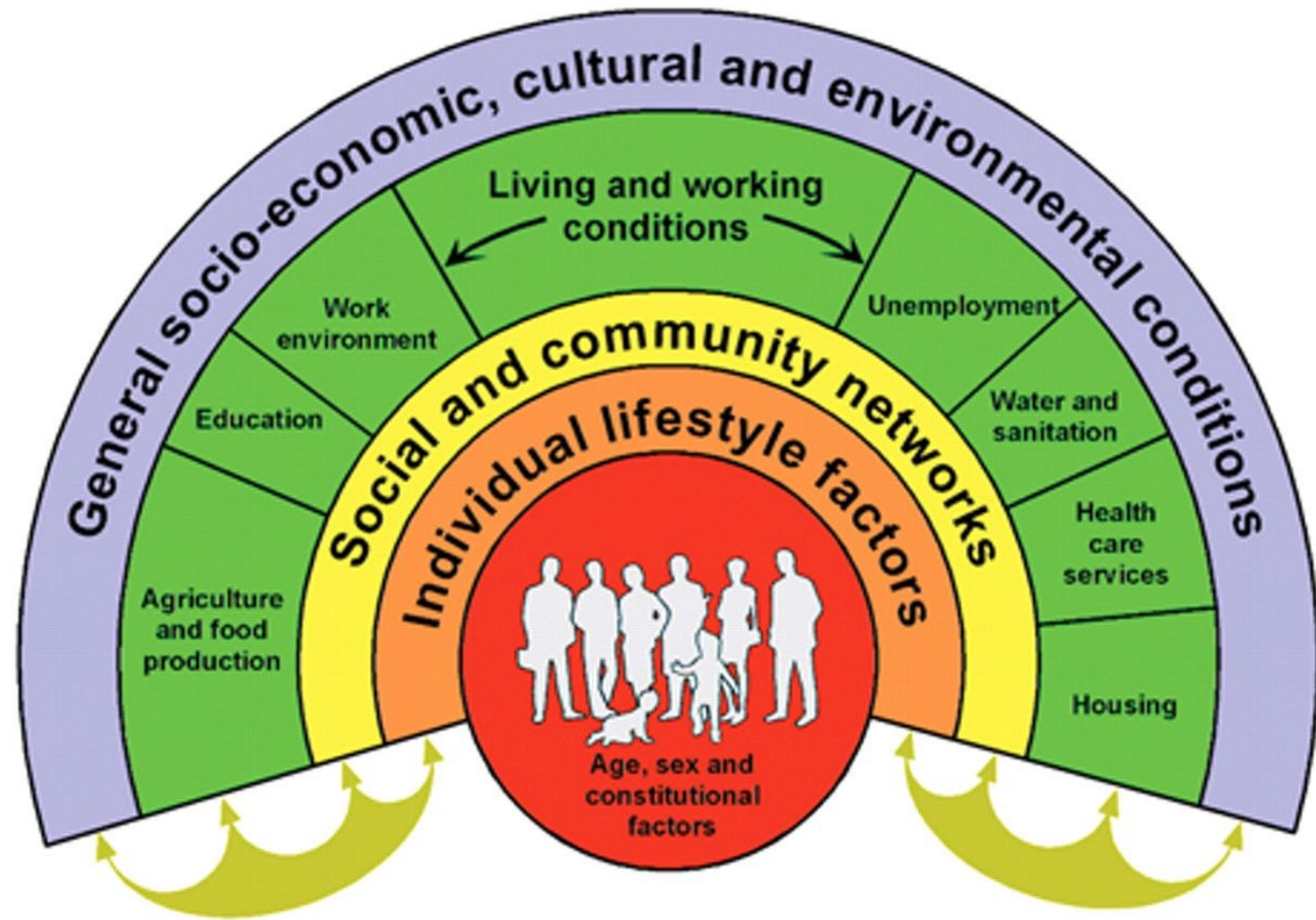
Lung health and outdoor air quality - 3

How does outdoor air pollution impact people living with asthma?

Objectives:

- Social determinants of health
- Outdoor air pollution: What is it?
- Types of regulated air pollutants (NAAQS)
 - Sources
 - Health impacts
- AQI: Air Quality Index
 - Management on poor air quality days
- Outdoor air pollution, climate change and health
- What can be done?
- Electric school buses in Michigan = Clean air for kids

Social determinants of health



Determinants of Health: Individual and Social.
Source: Dahlgren and Whitehead, 1991.

Social determinants of health - 2

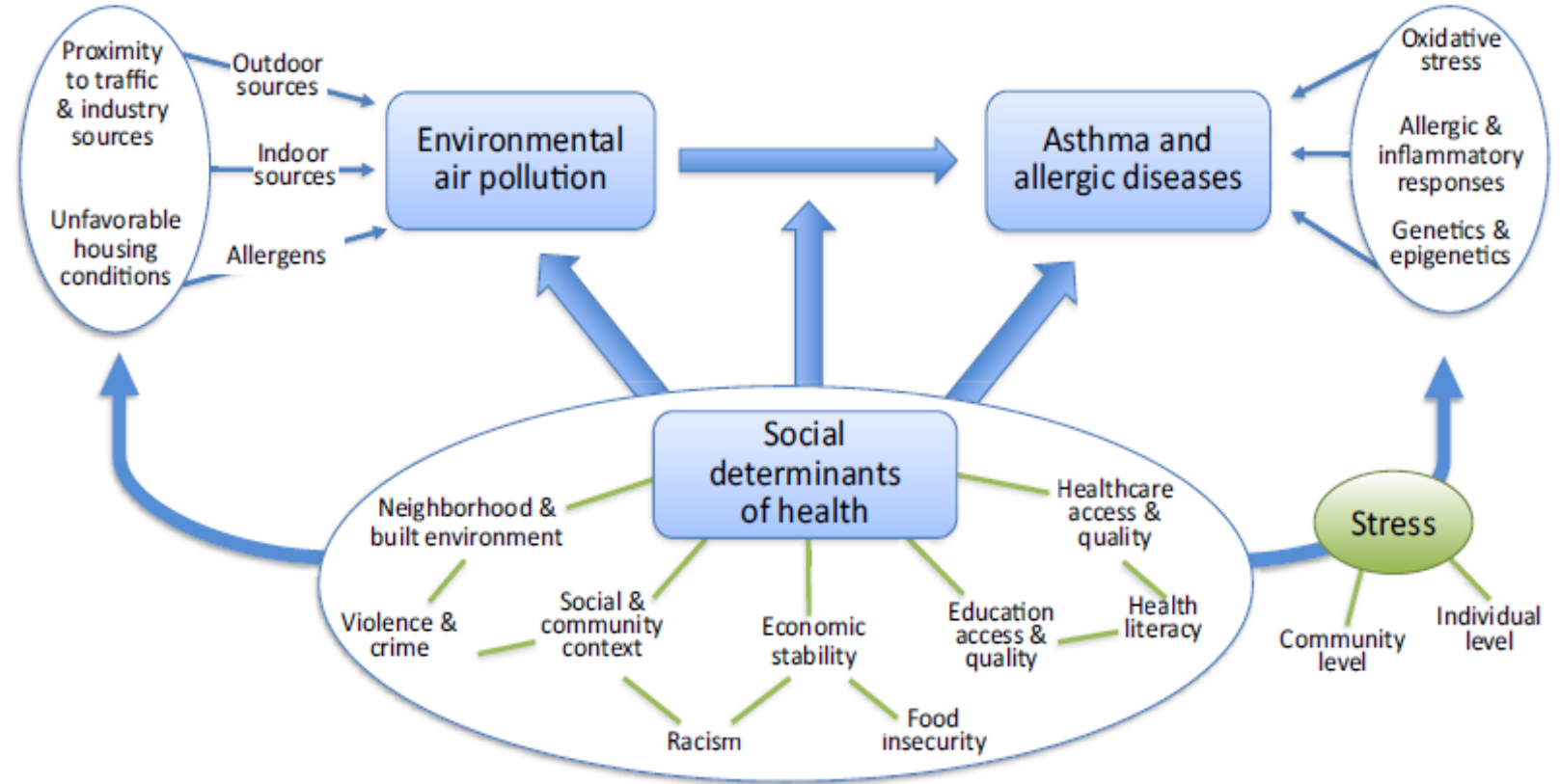


FIG 1. Conceptual diagram representing some of the complex relationships between Healthy People 2030 Social Determinants of Health and the influence on environmental air pollution exposure, asthma, and allergic diseases.

Outdoor air pollution

Ambient (outdoor) air pollution

19 December 2022

Key facts

- Air pollution is one of the greatest environmental risk to health. By reducing air pollution levels, countries can reduce the burden of disease from stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, including asthma.
- In 2019, 99% of the world's population was living in places where the WHO air quality guidelines levels were not met.
- The combined effects of ambient air pollution and household air pollution are associated with 6.7 million premature deaths annually.
- **Ambient (outdoor) air pollution is estimated to have caused 4.2 million premature deaths worldwide in 2019.**
- **Some 89% of those premature deaths occurred in low- and middle-income countries, and the greatest number in the WHO South-East Asia and Western Pacific Regions.**
- Policies and investments supporting cleaner transport, energy efficient homes, power generation, industry and better municipal waste management would reduce key sources of outdoor air pollution. Access to clean household energy would also greatly reduce ambient air pollution in some regions.



THE INVISIBLE KILLER

Air pollution may not always be visible, but it can be deadly.



36%
OF DEATHS FROM
LUNG CANCER



34%
OF DEATHS FROM
STROKE



27%
OF DEATHS FROM
HEART DISEASE

BREATHE LIFE.
Clean Air. Healthy Future.

NAAQS

Clean Air Act

- NAAQS- National Ambient Air Quality Standards
 - Carbon monoxide (CO)
 - Lead (Pb)
 - Nitrogen dioxide (NO₂)
 - Ozone (O₃)
 - Particle matter (PM_{2.5} and PM₁₀)
 - Sulfur dioxide (SO₂)

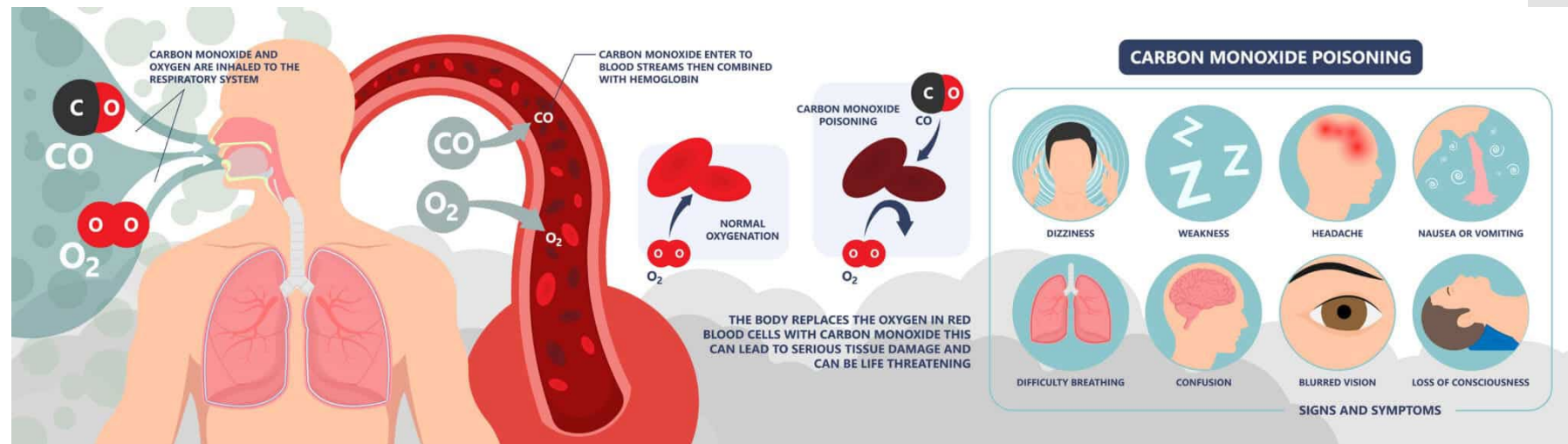
Carbon monoxide (CO)

Carbon Monoxide (CO) Sources:

- Combustion of fossil fuels
 - Tailpipes
- Unvented kerosene and gas space heaters, leaking chimneys and furnaces, and gas stoves

Health impacts:

- Dizziness, confusion, unconsciousness & death
- Displacement of oxygen carrying capacity of red blood cells is harmful to people with chronic heart and lung conditions



Lead (Pb)

Lead (Pb) Sources:

- Sources vary geographically
- National sources include ore and metals processing plants & leaded aviation fuel
- Local sources include waste incinerators, utilities, lead-acid battery manufacturers, and lead smelting facilities

Health Impacts:

- Passes into bloodstream and bioaccumulates in bones
- Affects oxygen-carrying capacity of blood
- Exposure dependent but can impact renal function and impair the following systems:
 - nervous
 - developmental
 - immune
 - reproductive
 - cardiovascular

LEAD AIR POLLUTION

Many activities can release lead into the air that can threaten the health of children.

Know your neighborhood sources of potential lead air pollution.

Aviation Gas

Leaded aviation gas (AvGas) is the most widely used lead-containing fuel in the U.S. Inhaling fuel emissions from small planes can increase a child's blood lead level. There is no known safe level of childhood lead exposure.



Shooting Ranges

Most ammunition creates lead gases and dust that can be breathed in by the shooter or people nearby.

Industrial

Lead can be released by many industries, including battery recyclers, pigment and glass makers, and lead weights and solder manufacturers. Without proper air filters, the lead emissions can escape and contaminate the surrounding neighborhood.



Construction

Half of the housing in California was built before residential lead-based paint was banned in 1978. Scraping, sanding, and demolishing old houses with such paint releases lead particles into the air.

Lead (Pb) - 2

HOW TO KEEP YOUR FAMILY LEAD-SAFE

If you live near a potential source of lead air pollution, consider using an air purifier with a HEPA¹ filter and cover bare dirt where children play.²



If you work with lead (airport, shooting range, battery recycling, construction, etc.), shower and change clothes before going home.



Lead poisoning causes learning and behavioral problems. Ask your child's doctor for a blood lead test.



Keep your home clean and dust-free. Wet-wipe surfaces and mop floors weekly. Take shoes off before coming inside.



For more information, visit www.cdph.ca.gov/Programs/CLPPB or contact:

¹ HEPA stands for high efficiency particulate air and can catch lead dust in the air.

² Cover bare dirt with grass or other plants, bark, gravel, or concrete.



CLPPB 8/2023

THE TOXIC EFFECTS OF LEAD



BRAIN & NERVE DAMAGE



DECREASED MENTAL ABILITY & LEARNING DIFFICULTIES



SPEECH, LANGUAGE & BEHAVIOUR PROBLEMS



HEARING PROBLEMS



ANAEMIA



HIGH BLOOD PRESSURE



REDUCED GROWTH



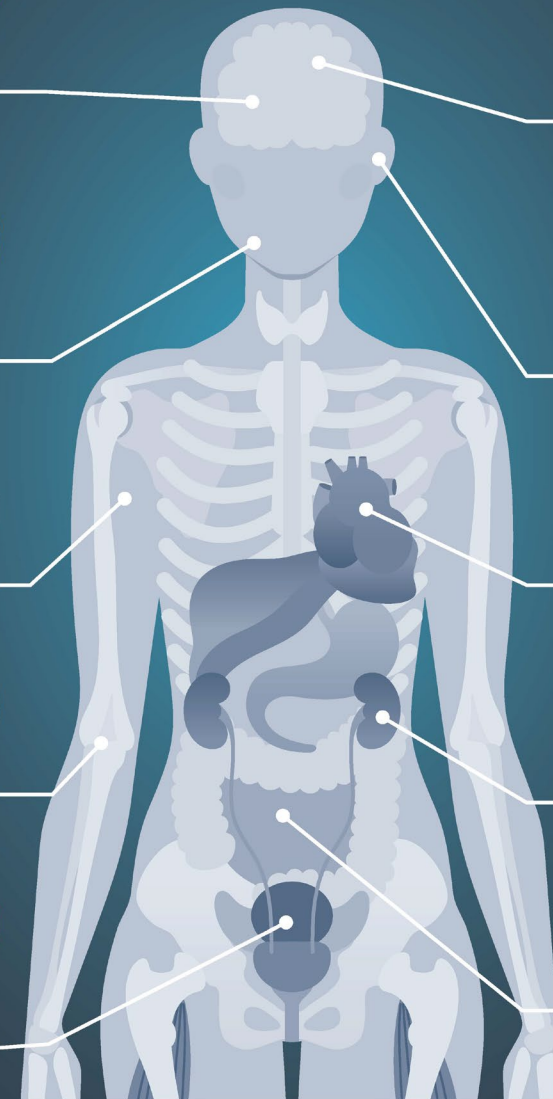
KIDNEY DAMAGE



REPRODUCTIVE PROBLEMS (ADULTS)



DIGESTIVE PROBLEMS



Nitrogen dioxide (NO₂)

Nitrogen dioxide (NO₂) sources:

- Group of highly reactive gases called nitrogen oxides (NO_x)
- Combustion of fossil fuels
 - Tailpipes



Health impacts:

- **Short term exposure**
 - Airway irritant & exacerbates chronic respiratory conditions
- **Long term exposure**
 - Development of asthma
 - Increase susceptibility to respiratory infections
- **High risk populations**
 - Children, elderly, people with asthma

Sulfur dioxide (SO₂)

Sulfur dioxide (SO₂) Sources:

- Burning of fossil fuels and power plants
- Natural sources to a lesser degree (e.g., volcanoes)



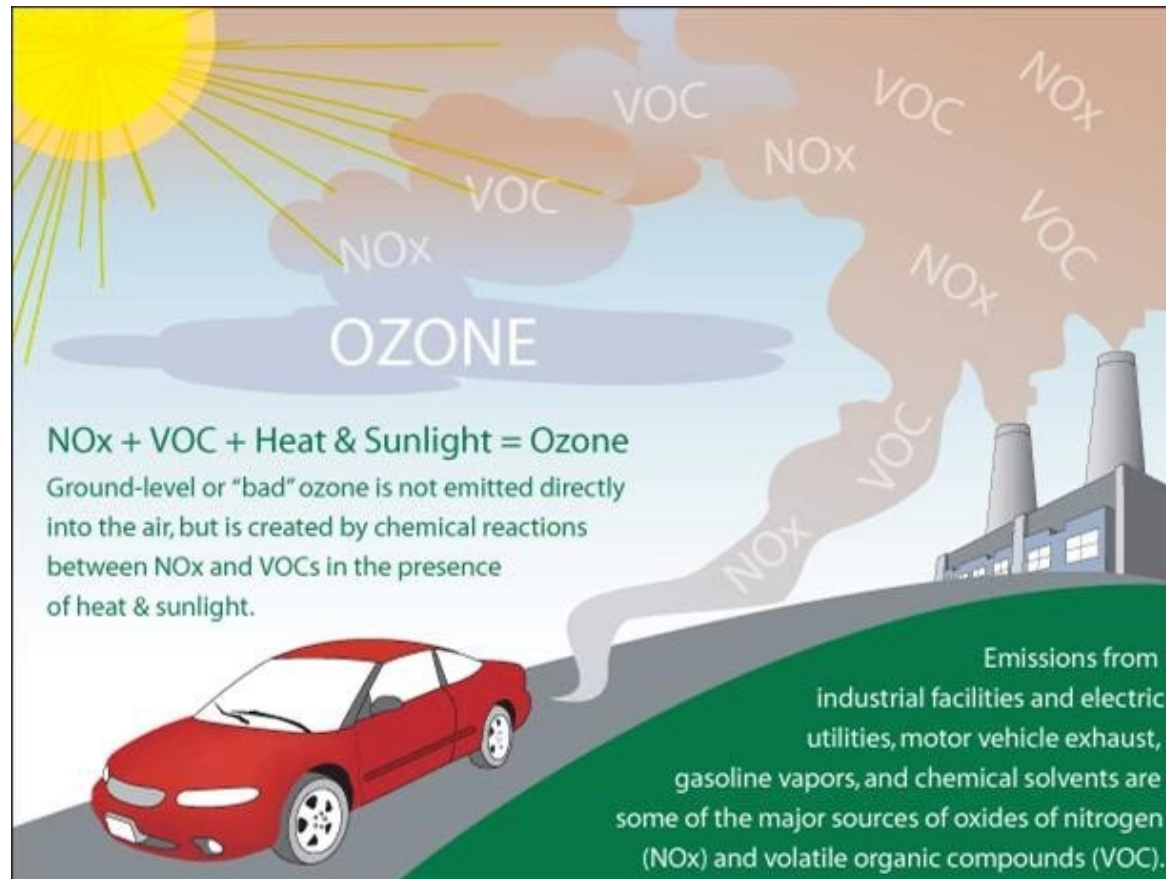
Health Impacts:

- Irritates the respiratory system and can make breathing difficult
- **High risk populations:** Children, elderly and people with asthma
- High levels of atmospheric SO₂ can lead to formation of other sulfur oxides (SO_x), which contribute to particulate matter pollution

Ozone (O₃)

Ozone (O₃) Sources:

- Good (stratospheric) ozone vs. bad (ground-level) ozone
- Created by a chemical reaction between NO_x, volatile organic compounds (VOCs) and heat/sunlight

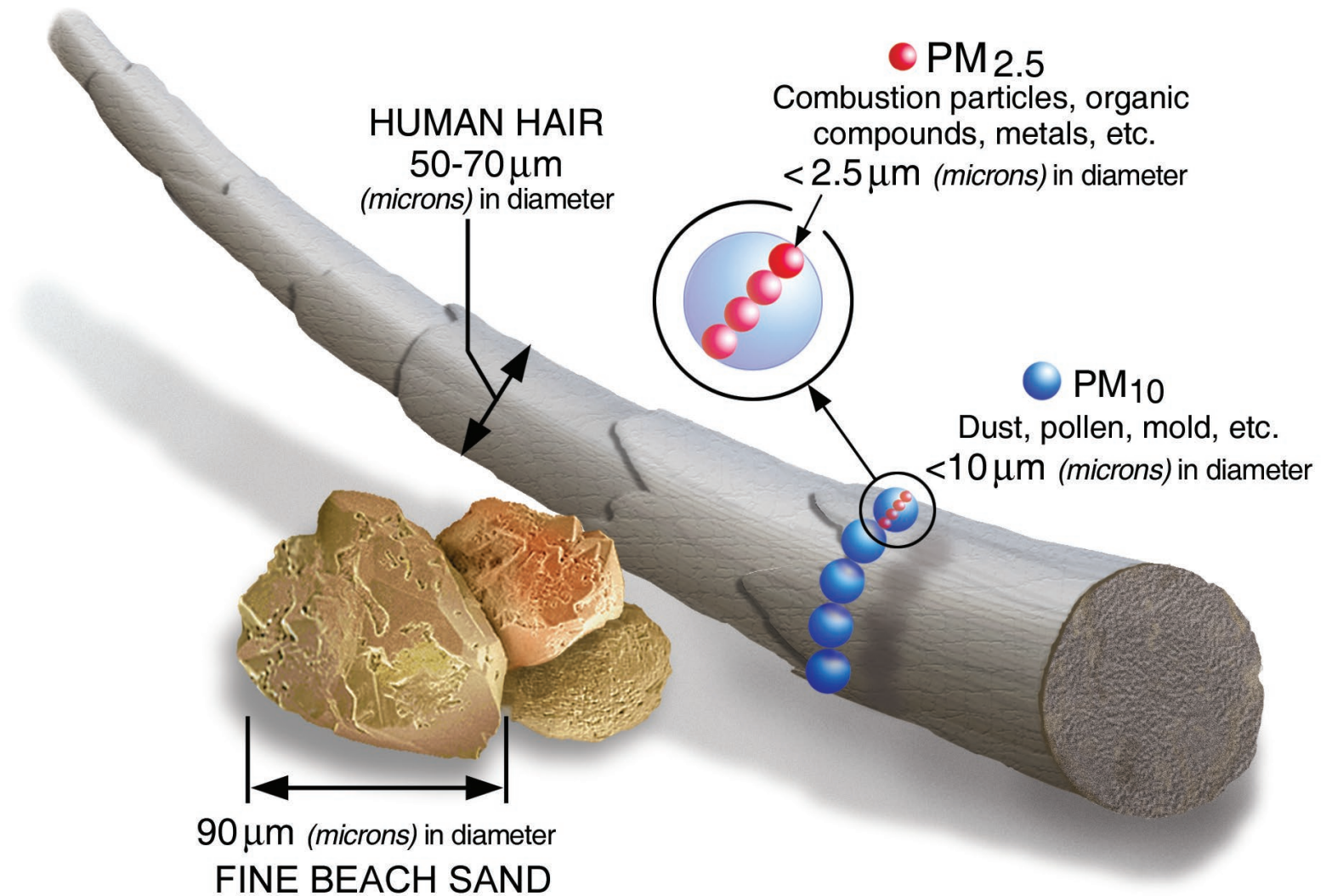


Ozone (O₃) - 2

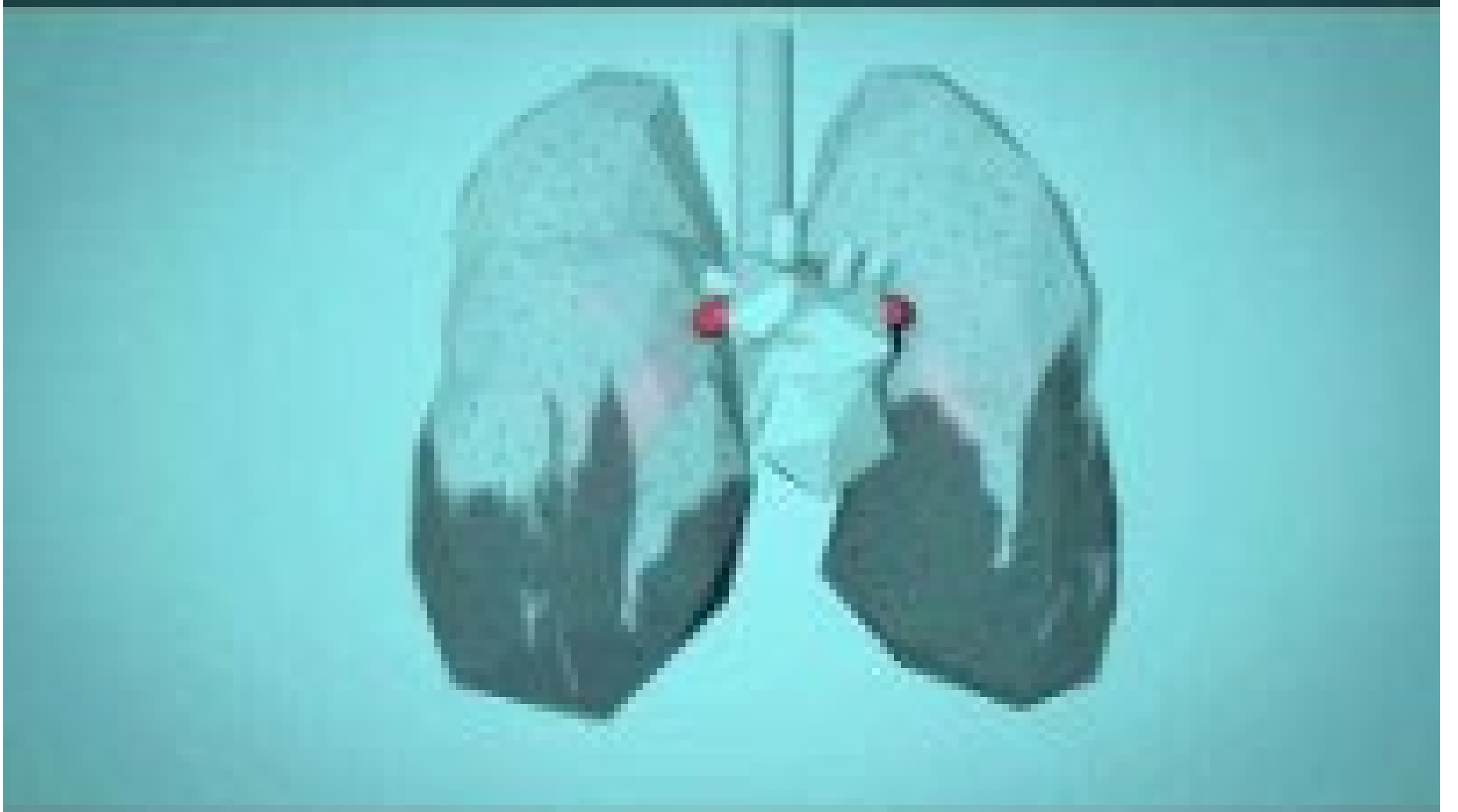
Health Impacts:

- **At risk populations:** people with asthma, children, older adults, and people who are active outdoors, especially outdoor workers
- **Short term exposure:**
 - Upper airway irritation;
 - Inflammation and damage to airways increasing risk of infection;
 - Exacerbation of lung diseases, such as asthma, emphysema and bronchitis;
 - Increased frequency of asthma attacks
- **Long term exposure:**
 - Asthma exacerbation and development;
 - Premature death from respiratory causes

Particulate matter (PM_{2.5-10})



How Air Pollution Affects Your Body



Particulate matter (PM_{2.5-10}) - 2

PM 2.5-10 Sources:

- Many sizes and shapes composed of hundreds of different chemicals and liquids
- Primary sources are emitted directly from construction sites, unpaved roads, fields, residential fireplaces, wood stoves & wildfires
- Secondary sources result from the byproducts of the combustion of carbon-based fuels



Particulate matter (PM_{2.5-10}) - 3

Health Impacts:

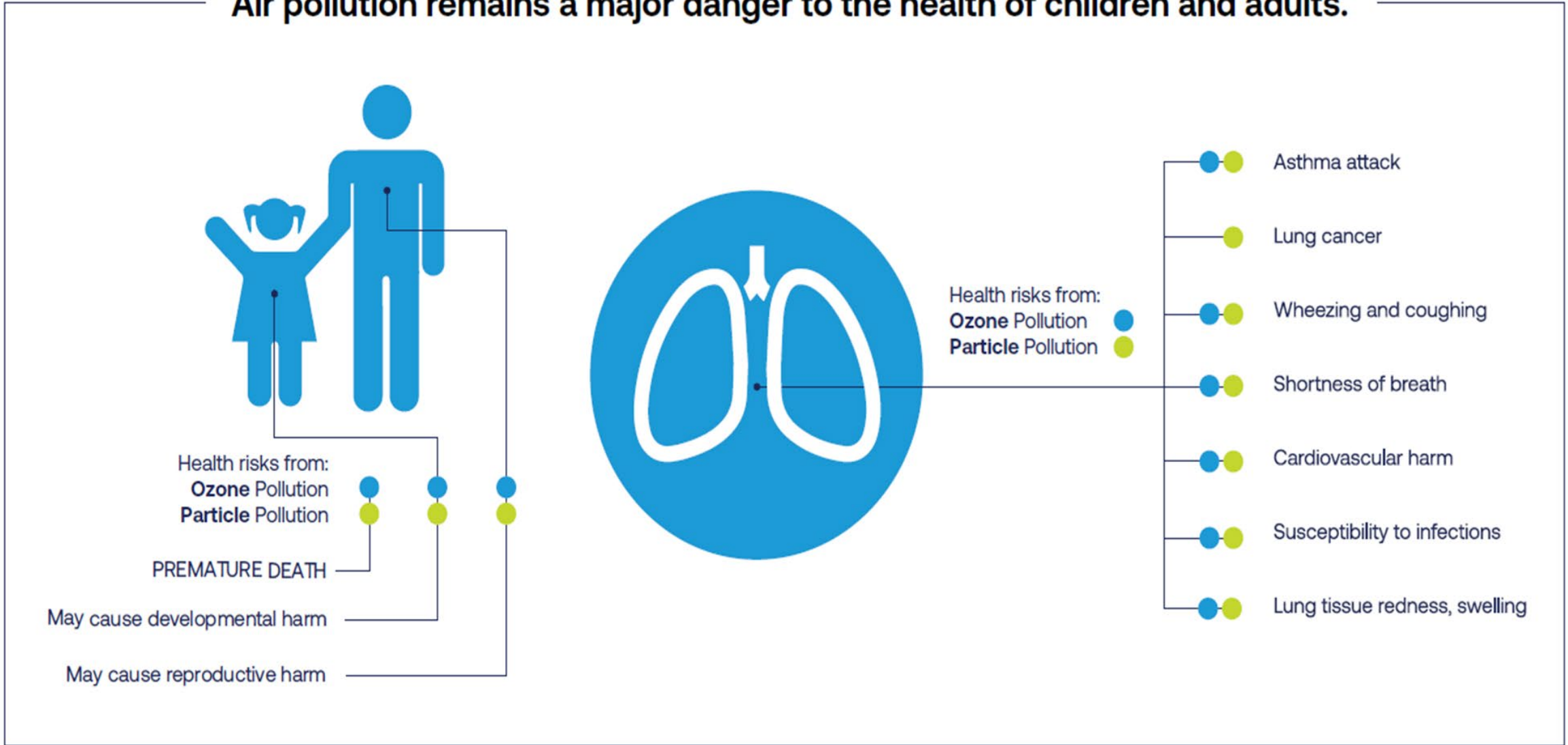
Short term exposure (hours to days) is linked to increased:

- Infant mortality
- Hospitalizations for cardiovascular disease
- Hospitalizations and ED visits for COPD
- Hospitalizations for children with asthma
- Severity of asthma exacerbations among children

Long term exposure (day after day, year round) is linked to:

- Higher likelihood of developing childhood asthma;
- Worsening COPD in adults;
- Slowed lung function & growth in children & teenagers;
- Increased risk of heart attacks & strokes
- Higher likelihood of getting lung cancer and developing diabetes;
- Neurological impacts
- Altered birth outcomes
- Increased risk of death from cardiovascular disease

Air pollution remains a major danger to the health of children and adults.

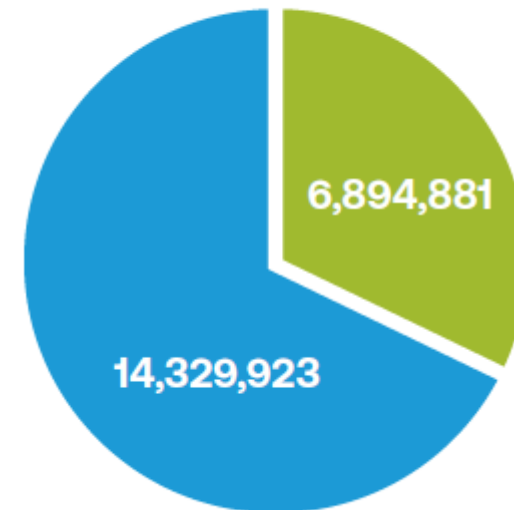


Disproportionate impacts

State of the Air 2020

Americans Living in Counties with 3 Failing Grades: Ozone Days, Particle Days, Annual Particle Levels

- White
- People of Color



Sensitive populations

Who are sensitive populations?

- People with pre-existing heart and lung conditions, such as asthma, COPD and coronary artery disease, and diabetes
- Children
- Older adults
- Pregnant women
- Increased exposure factors
 - Outdoor workers
 - Athletes
 - Mobility challenges/ devices
 - Social determinants of health

Why children?

- Higher respiratory rates
 - Breathe more air per lb/kg of body weight
- Developing lungs
- Increased exposure to outdoor air with activities
- Proximity to tailpipes



Air Quality Index (AQI)

AQI: What is it?

- Nationally uniform color-coded index for reporting and forecasting daily air quality
 - PM, O₃, CO, SO₂
- Intended to inform the public of how clean or polluted the air is and how to avoid health effects associated with poor air quality

What does it mean?

- Scale of 0-500
 - Higher scores correlate to higher pollution and health concerns
- 0-100 NAAQS
- 100-150 High risk populations
 - Children, seniors and those with pre-existing chronic heart and lung conditions, such as asthma and COPD
- >150 Health concerns for everyone

Air Quality Index (AQI) - 2

Air Quality Index	Who Needs to be Concerned?	What Should I Do?
Good 0-50	It's a great day to be active outside.	
Moderate 51-100	Some people who may be unusually sensitive to particle pollution.	<p>Unusually sensitive people: Consider reducing prolonged or heavy exertion. Watch for symptoms such as coughing or shortness of breath. These are signs to take it easier.</p> <p>Everyone else: It's a good day to be active outside.</p>
Unhealthy for Sensitive Groups 101-150	Sensitive groups include people with heart or lung disease, older adults, children and teenagers.	<p>Sensitive groups: Reduce prolonged or heavy exertion. It's OK to be active outside, but take more breaks and do less intense activities. Watch for symptoms such as coughing or shortness of breath.</p> <p>People with asthma should follow their asthma action plans and keep quick relief medicine handy.</p> <p>If you have heart disease: Symptoms such as palpitations, shortness of breath, or unusual fatigue may indicate a serious problem. If you have any of these, contact your health care provider.</p>
Unhealthy 151 to 200	Everyone	<p>Sensitive groups: Avoid prolonged or heavy exertion. Move activities indoors or reschedule to a time when the air quality is better.</p> <p>Everyone else: Reduce prolonged or heavy exertion. Take more breaks during all outdoor activities.</p>
Very Unhealthy 201-300	Everyone	<p>Sensitive groups: Avoid all physical activity outdoors. Move activities indoors or reschedule to a time when air quality is better.</p> <p>Everyone else: Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling to a time when air quality is better.</p>
Hazardous 301-500	Everyone	<p>Everyone: Avoid all physical activity outdoors.</p> <p>Sensitive groups: Remain indoors and keep activity levels low. Follow tips for keeping particle levels low indoors.</p>

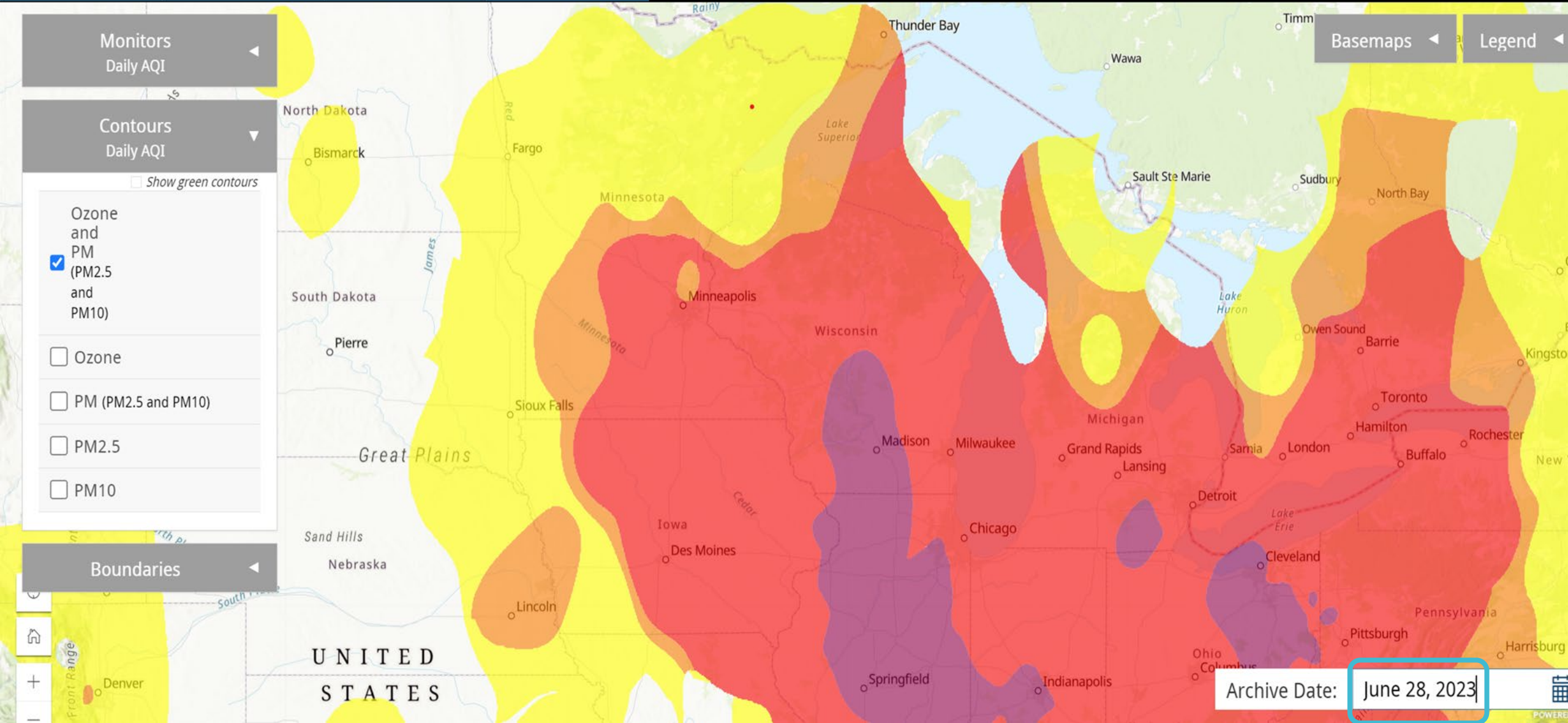
Monitors
Daily AQI

Contours
Daily AQI

- Show green contours
- Ozone and PM (PM2.5 and PM10)
 - Ozone
 - PM (PM2.5 and PM10)
 - PM2.5
 - PM10

Boundaries

Basemaps Legend



Archive Date: **June 28, 2023**

Action! Days This Year



Location	Year	Number	Dates
Ann Arbor	2023	21	4/14, 5/30, 5/31, 6/1, 6/2, 6/8, 6/9, 6/21, 6/27, 6/28, 6/29, 6/30, 7/1, 7/4, 7/5, 7/10, 7/16, 7/17, 7/25, 7/27, 7/28
Benton Harbor	2023	22	4/14, 5/30, 5/31, 6/1, 6/2, 6/8, 6/21, 6/22, 6/24, 6/27, 6/28, 6/29, 6/30, 7/1, 7/4, 7/5, 7/10, 7/16, 7/17, 7/25, 7/27, 7/28
Detroit	2023	21	4/14, 5/30, 5/31, 6/1, 6/2, 6/8, 6/9, 6/21, 6/27, 6/28, 6/29, 6/30, 7/1, 7/4, 7/5, 7/10, 7/16, 7/17, 7/25, 7/27, 7/28
Eastern U.P.	2023	10	6/24, 6/26, 6/27, 6/28, 6/29, 6/30, 7/1, 7/15, 7/16, 7/25
Flint	2023	13	5/31, 6/1, 6/2, 6/8, 6/9, 6/27, 6/28, 6/29, 6/30, 7/1, 7/16, 7/17, 7/25
Grand Rapids	2023	22	4/14, 5/30, 5/31, 6/1, 6/2, 6/8, 6/21, 6/22, 6/24, 6/27, 6/28, 6/29, 6/30, 7/1, 7/4, 7/5, 7/10, 7/16, 7/17, 7/25, 7/27, 7/28
Houghton Lake	2023	7	6/27, 6/28, 6/29, 6/30, 7/1, 7/16, 7/25
Kalamazoo	2023	12	5/31, 6/1, 6/2, 6/8, 6/27, 6/28, 6/29, 6/30, 7/1, 7/16, 7/17, 7/25
Lansing	2023	11	6/1, 6/2, 6/8, 6/27, 6/28, 6/29, 6/30, 7/1, 7/16, 7/17, 7/25
Ludington	2023	17	4/14, 5/30, 5/31, 6/1, 6/2, 6/21, 6/24, 6/27, 6/28, 6/29, 6/30, 7/1, 7/4, 7/5, 7/16, 7/17, 7/25
Saginaw	2023	10	6/8, 6/9, 6/27, 6/28, 6/29, 6/30, 7/1, 7/16, 7/17, 7/25
Traverse City	2023	16	4/14, 5/30, 5/31, 6/1, 6/2, 6/21, 6/24, 6/27, 6/28, 6/29, 6/30, 7/1, 7/4, 7/5, 7/16, 7/25

Air Action! Days

Action! Days in 2022



Location	Year	Number	Dates
Ann Arbor	2022	5	6/15, 6/25, 7/11, 7/18, 7/19
Benton Harbor	2022	6	6/15, 6/20, 6/21, 6/30, 7/11, 7/19
Detroit	2022	5	6/15, 6/25, 7/11, 7/18, 7/19
Eastern U.P.	2022	0	
Flint	2022	0	
Grand Rapids	2022	6	6/15, 6/20, 6/21, 6/30, 7/11, 7/19
Houghton Lake	2022	0	
Kalamazoo	2022	0	
Lansing	2022	0	
Ludington	2022	4	6/15, 6/20, 6/21, 7/19
Saginaw	2022	0	
Traverse City	2022	0	

Air Action!

Days - 2

Recommendations for poor air quality days:

- Awareness!
- Know when and where air pollution may be bad
 - Monitor daily air quality reports as you would the weather report (Airnow.gov)
 - Enroll in *EnviroFlash* alerts via email or text
- Get to know how sensitive you are to air pollution; Listen to your body.
- Change activity levels and time outdoors
 - Limit duration of time (exposure) outdoors
 - Limit intensity (respiratory rate) of activity outdoors
- Stay indoors or go out when AQI improves
- Develop action plan with patients
 - Rescue inhalers at the ready

Ozone Pollution and Your Patients' Health:

<https://www.epa.gov/ozone-pollution-and-your-patients-health>

Particle Pollution and Your Patients' Health:

<https://www.epa.gov/pmcourse>

Wildfire Smoke and Your Patients' Health:

<https://www.epa.gov/wildfire-smoke-course>


Air Quality and Activity Guidance for Schools:

<https://www.airnow.gov/publications/activity-guides/air-quality-activity-guidance-for-schools/>

Resources for health care providers

Effects of Common Air Pollutants

RESPIRATORY EFFECTS



Symptoms:

- Cough
- Phlegm
- Chest tightness
- Wheezing
- Shortness of breath

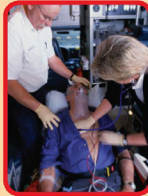
Increased sickness and premature death from:

- Asthma
- Bronchitis (acute or chronic)
- Emphysema
- Pneumonia

Development of new disease

- Chronic bronchitis
- Premature aging of the lungs

CARDIOVASCULAR EFFECTS

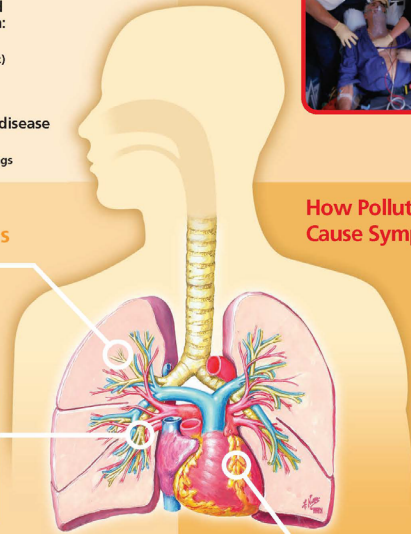


Symptoms:

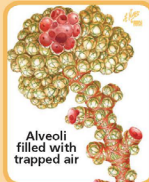
- Chest tightness
- Chest pain (angina)
- Palpitations
- Shortness of breath
- Unusual fatigue

Increased sickness and premature death from:

- Coronary artery disease
- Abnormal heart rhythms
- Congestive heart failure
- Stroke




How Pollutants Cause Symptoms



Effects on Lung Function


- Narrowing of airways (bronchoconstriction)
- Decreased air flow




Airway Inflammation

- Influx of white blood cells
- Abnormal mucus production
- Fluid accumulation and swelling (edema)
- Death and shedding of cells that line airways

Increased Susceptibility to Respiratory Infection

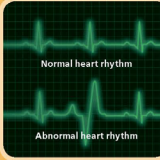


Normal

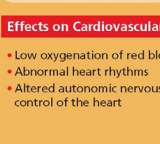


Lung with respiratory infection

How Pollutants Cause Symptoms



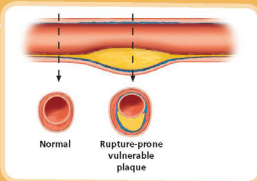
Normal heart rhythm



Abnormal heart rhythm

Effects on Cardiovascular Function

- Low oxygenation of red blood cells
- Abnormal heart rhythms
- Altered autonomic nervous system control of the heart



Vascular Inflammation

- Increased risk of blood clot formation
- Narrowing of vessels (vasoconstriction)
- Increased risk of atherosclerotic plaque rupture



Reduce your risk by using the Air Quality Index (AQI) to plan outdoor activities – www.airnow.gov

AQI Levels of Health Concern	AQI Values	What Action Should People Take?
Good	0-50	Enjoy Activities
Moderate	51-100	People unusually sensitive to air pollution: Plan strenuous outside activities when air quality is better
Unhealthy for Sensitive Groups	101-150	Sensitive Groups: Cut back or reschedule strenuous outside activities Ozone: People with lung disease, children and older adults and people who are active outdoors Particulate Pollution: People with heart or lung disease (including diabetics), older adults and children Carbon Monoxide: People with heart disease and possibly infants and fetuses Nitrogen Dioxide: People with lung disease, children and older adults Sulfur Dioxide: Active children and adults with asthma
Unhealthy	151-200	Everyone: Cut back or reschedule strenuous outside activities Sensitive groups: Avoid strenuous outside activities
Very Unhealthy	201-300	Everyone: Significantly cut back on outside physical activities Sensitive groups: Avoid all outside physical activities

Wildfire smoke

Special considerations for people with chronic heart & lung conditions and diabetes:

- Check in with your HCP to see if medications need adjusting
- Monitor symptoms closely
- Ask about parameters for oxygen use
- Know when to seek medical attention
- Watch for delayed symptoms 24-48 hours after exposure

Action plans: American Lung Association

- [Asthma action plan](#)



Wildfire smoke

PROTECT YOURSELF FROM WILDFIRE SMOKE

When wildfire smoke is in the area, check [AirNow.gov](https://www.airnow.gov) for the most up-to-date information on air quality near you.

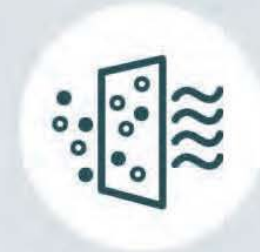
Wildfire smoke can affect anyone, but some people are more sensitive to particle pollution. When the air quality is the unhealthy range for you, consider doing the following:



Stay indoors. Keep time outdoors short and avoid strenuous activities.



If you must be outdoors, wear an N-95 mask for best protection.



Run forced air system on fan or cooling. Window air conditioning can be used on recirculate.



Limit activities that create indoor air pollution like frying foods and using gas powered appliances.



Limit outdoor activities like campfires, residential wood boilers, and gas-powered vehicles.



MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

Sign up for alerts at [EnviroFlash.info](https://www.enviroflash.info)
[Michigan.gov/WildfireSmokeAndHealth](https://www.michigan.gov/WildfireSmokeAndHealth)

Woodstove smoke

Recommendations for woodstove smoke

- Be sure to inquire with people how they are heating their homes and assess for poorly ventilated heating sources
- Best practices for home wood stoves
 - Improves indoor and outdoor air quality

Burn Wise

Program of U.S. EPA

BURN THE RIGHT WOOD, THE RIGHT WAY, IN THE RIGHT WOOD-BURNING APPLIANCE

Did you know that by changing the way you burn wood you can save money, reduce air pollution and protect your health?

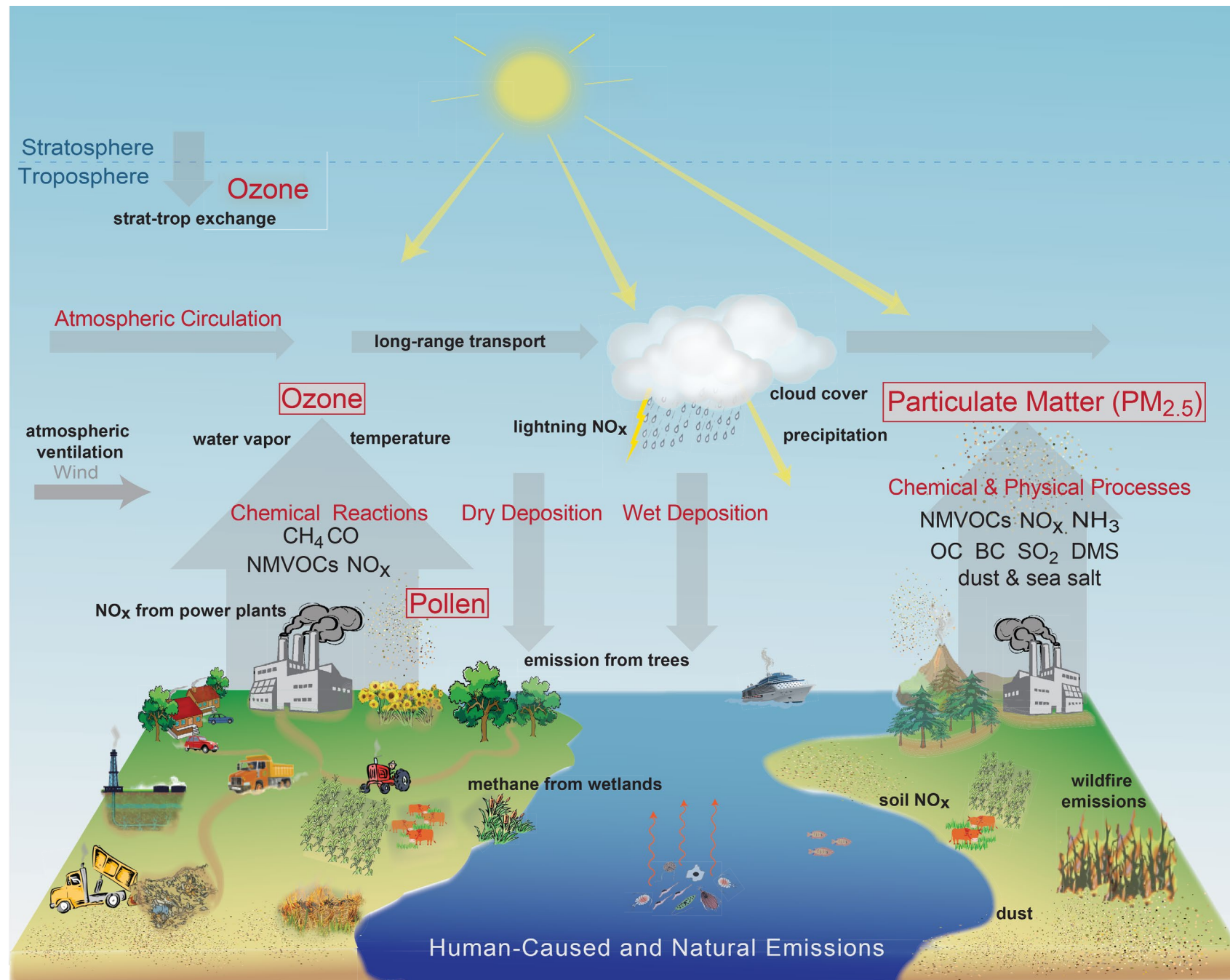
Here are a few simple tips to make your fire burn hotter, keep your wallet fatter and keep your local air cleaner and healthier.

- Season all firewood.** All firewood should be split, securely covered or stored, and aged for at least six months. Seasoned wood burns hotter, cuts fuel consumption and reduces the amount of smoke your appliance produces.
- Choose the right firewood.** Hardwoods are the best. Never burn trash or treated wood which can emit toxic air pollutants.
- Start it right.** Use only clean newspaper or dry kindling to start a fire. Never use gasoline, kerosene, charcoal starter, or a propane torch.
- Don't let the fire smolder.** Many people think they should let a fire smolder overnight. But reducing the air supply does little for heating and increases air pollution.
- Clean ashes from your wood-burning appliance.** Excess ashes can clog the air intake vents reducing efficiency. Be sure to dispose of ashes in a metal container away from the house or any flammable material to reduce the risk of fire.
- Keep your chimney clean.** A clean chimney provides good draft for your wood-burning appliance and reduces the risk of a chimney fire. Have a certified professional inspect your chimney once a year.
- Be a good neighbor.** Follow best practices for burning wood. Always remember to comply with state and local codes and check your local air quality forecast.
- Follow instructions.** Operate your wood-burning appliance according to the manufacturer's instructions and follow all maintenance procedures.
- Upgrade to cleaner equipment.** EPA-certified wood stoves and fireplace inserts burn cleaner and burn wood more efficiently emitting less particle pollution than older models.
- Size matters.** Choose the right-sized appliance for your needs. If your wood-burning appliance is too big for your room or house, the fuel will smolder and create more air pollution.

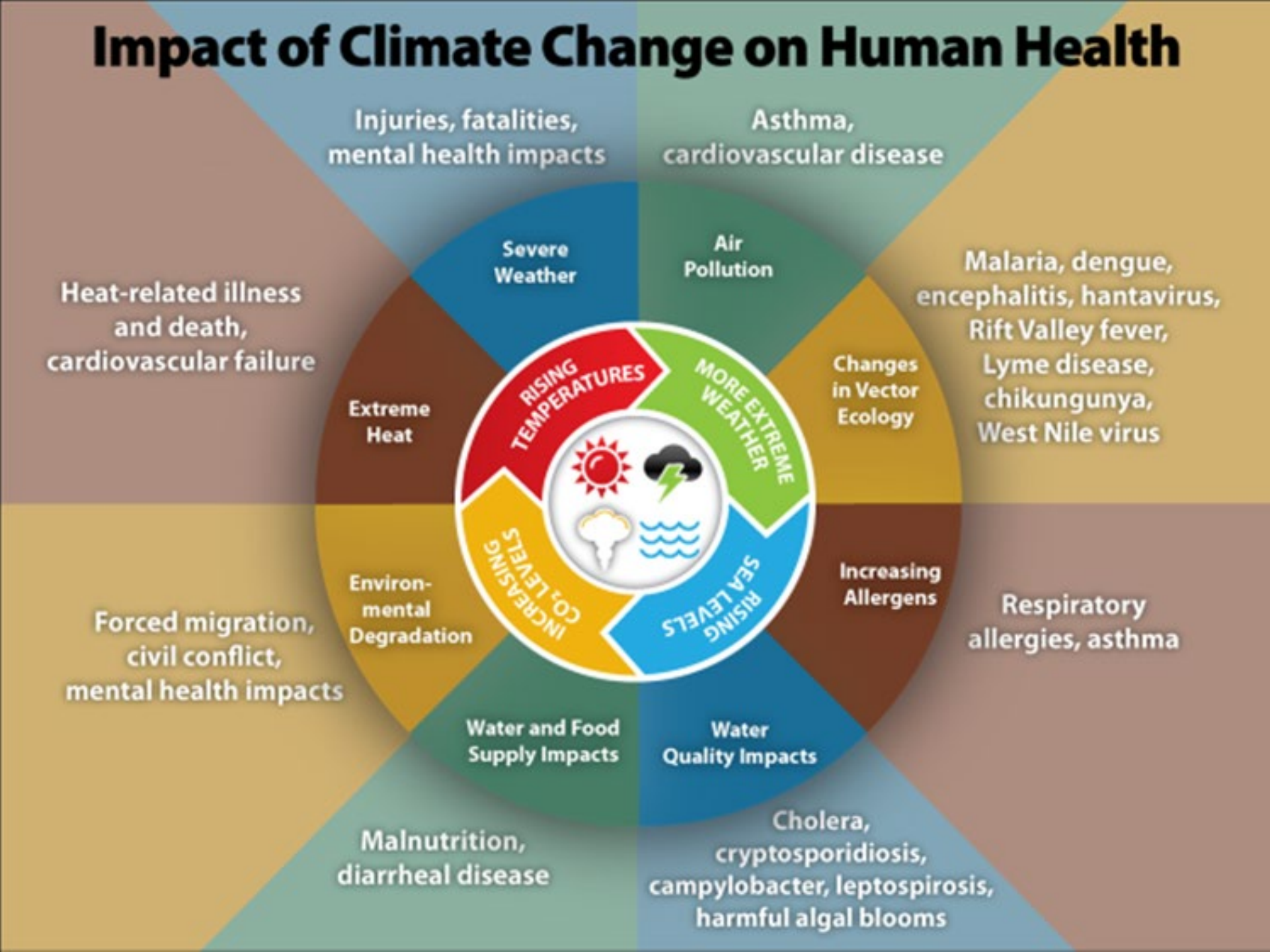
 EPA For more information on how to burn wise, go to www.epa.gov/burnwise

EPA-456/F-09-004

Air pollution and climate change



Impact of Climate Change on Human Health



Climate and health

Climate Change in the Great Lakes Region

GLISA
A NOAA RISA TEAM



Source: GLISA <https://glisa.umich.edu/summary-climate-information/>
<https://www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.ncdc:C00005>

What we can ALL do

Recommendations for Action: AirNOW.gov

- Reduce your own contributions to air pollution:
 - Walking and biking when AQI < 100
 - Use clean, efficient and sustainable ways to get around
 - Drive sensibly
- Household tips:
 - Use environmentally safe cleaning products and paints
 - Conserve electricity
 - Wood stove tips to improve efficiency and decrease PM pollution
 - Mulch and compost yard waste, do not burn!

Air Action Days:

- Ozone:
 - Conserve electricity and set AC to warmer temperature
 - Choose a cleaner commute if possible
 - Refuel after dusk
 - Combine errands and reduce or eliminate trips
 - Limit idling
 - Keep evaporative chemical use to a minimum
- Particulate Matter:
 - Reduce or eliminate wood stove use
 - Avoid gas-powered lawn and garden equipment
 - Avoid burning leaves, trash and other materials

Diesel exhaust:
A trigger for
asthma on the
school bus

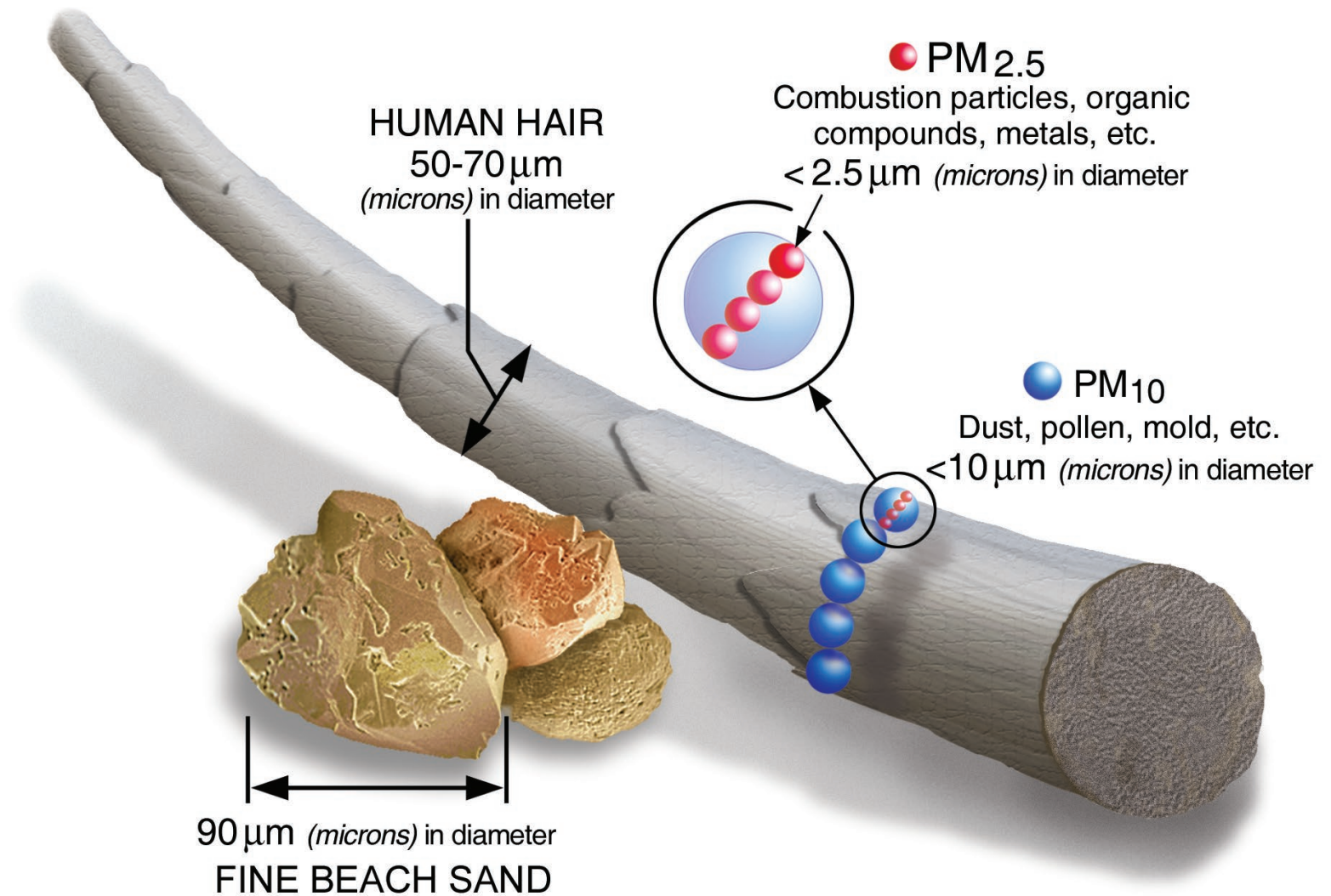


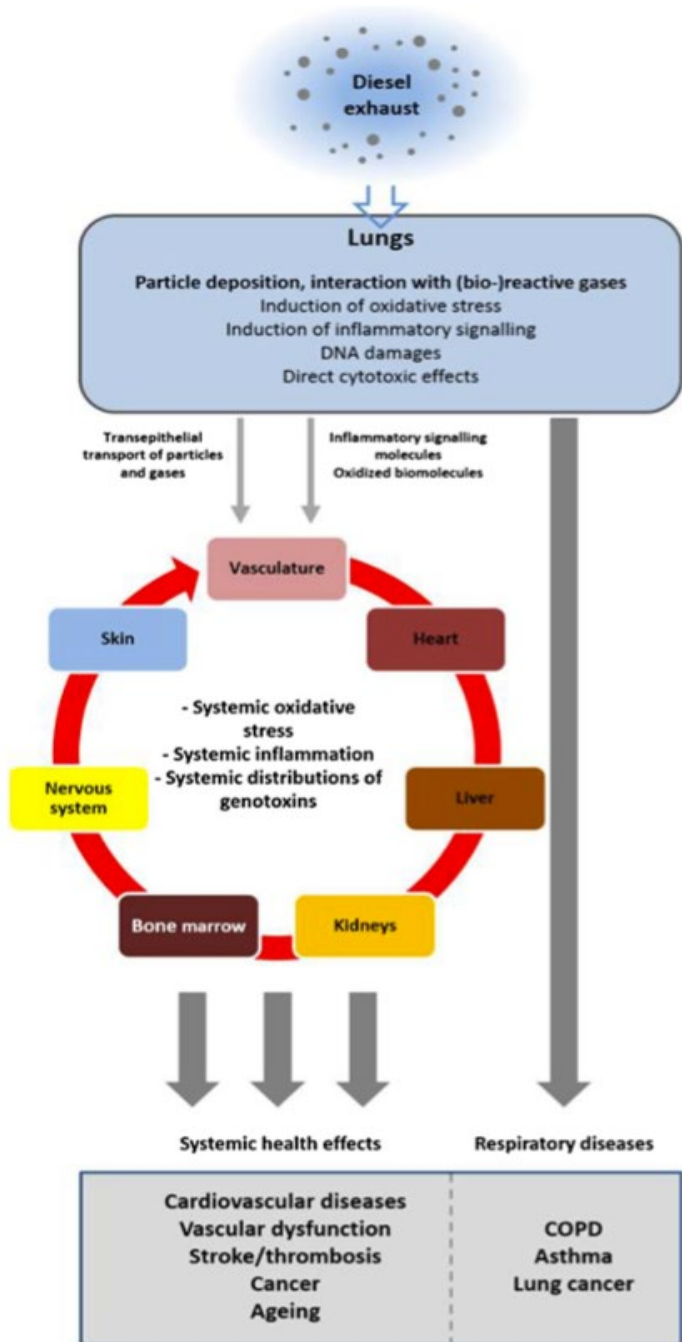
Diesel Pollutants

- Particulate Matter (PM)
- Nitrogen Oxides (NOx)
- Climate Change
- Nitrogen Oxides (NOx)
- Human Health
- Carbon Monoxide (CO)
- Carbon Dioxide (CO₂)
- Other Greenhouse Gases (GHG)
- Air Toxics



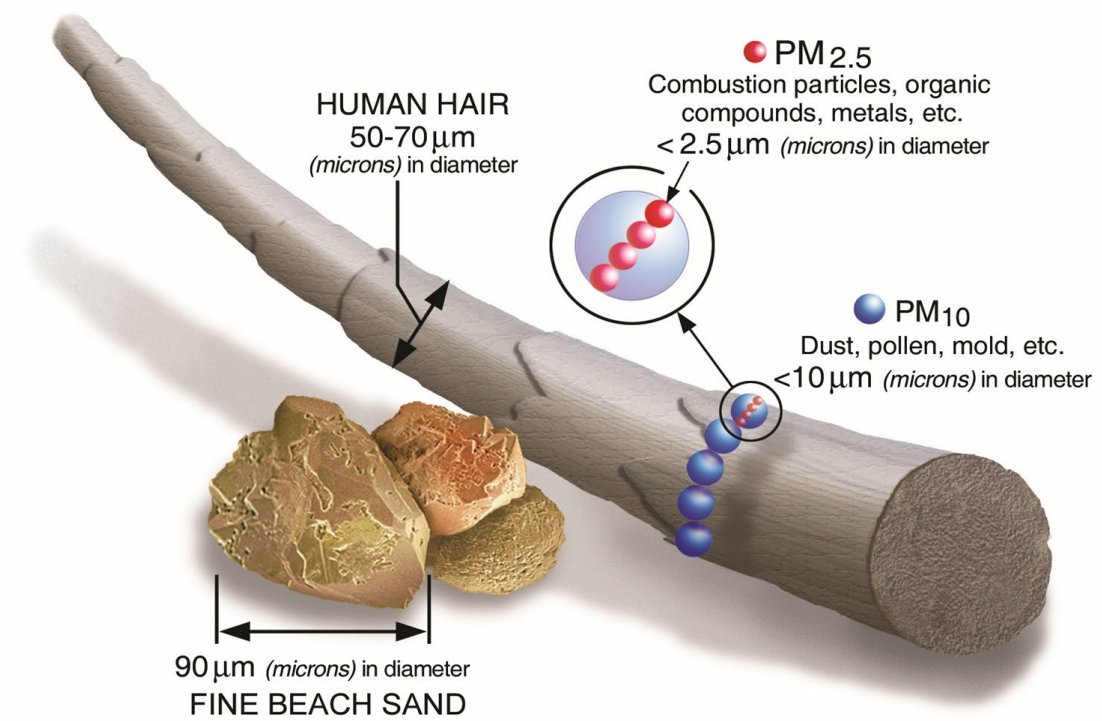
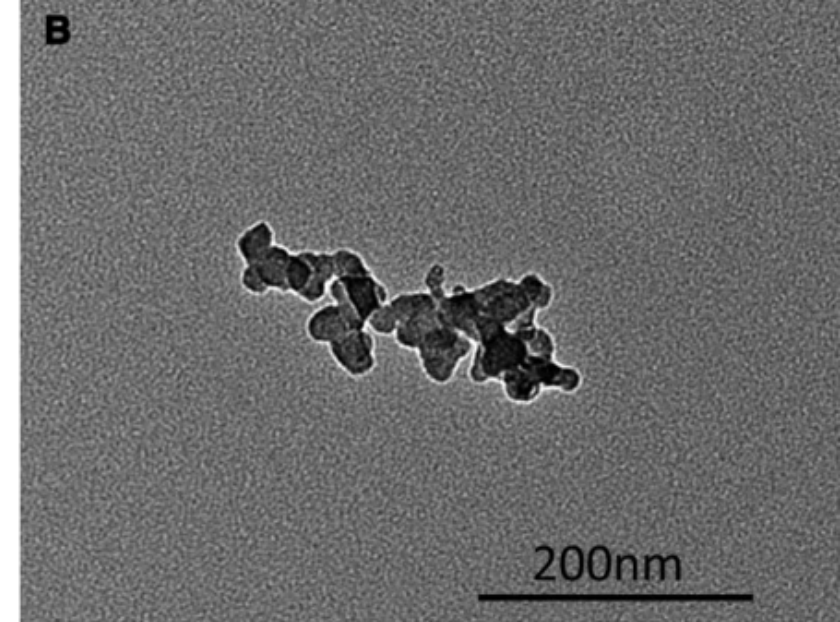
Particulate matter (PM_{2.5-10}) - 4





Diesel particles

1 nanometer (nm) = 0.001 micrometer or micron (μm)
 200 nm = 0.2 μm

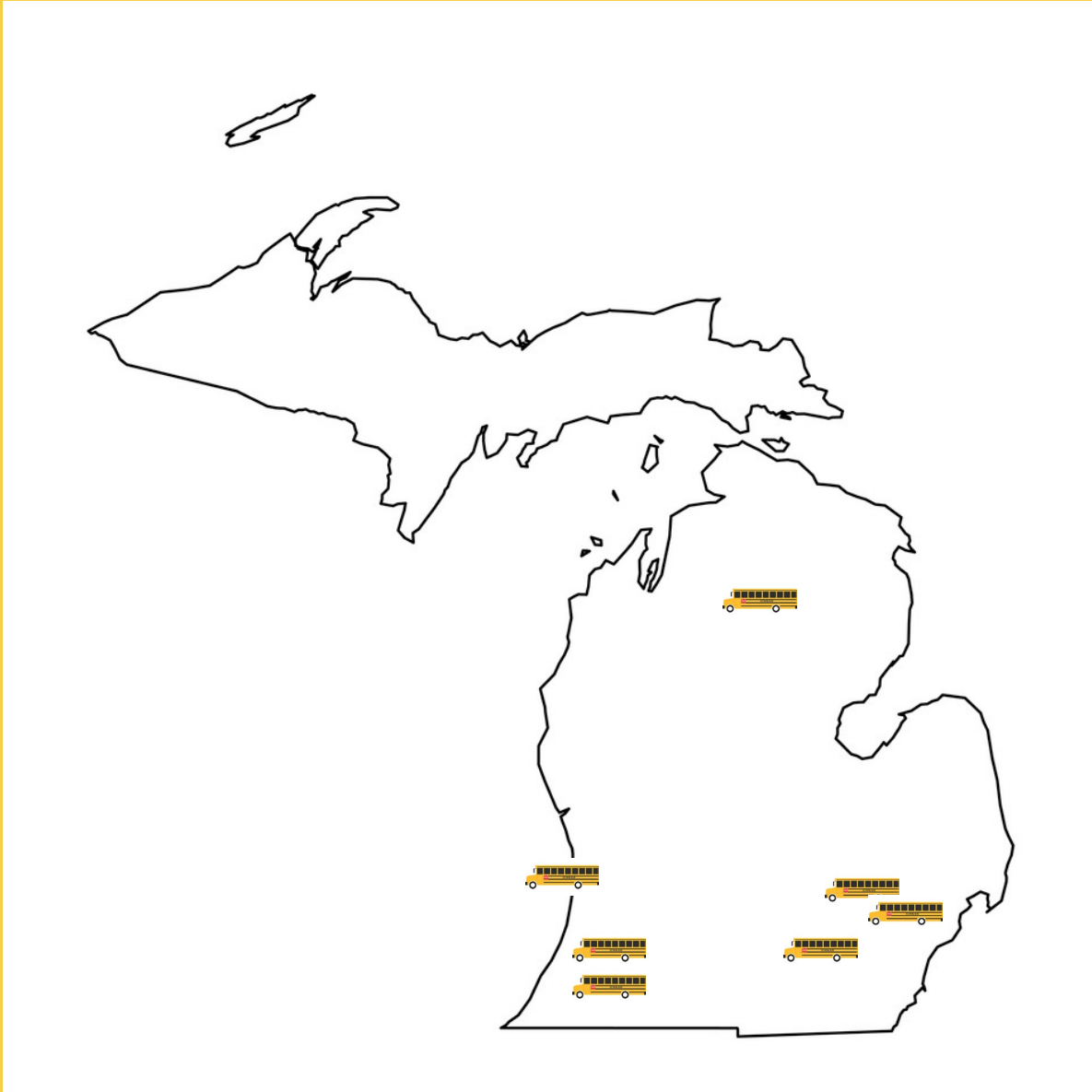


ESBs in MI:
A clean air
success story

How it started...



Michigan's ESB History: 2017 - present



2017

DEQ: Michigan VW mitigation trust fund

→ 7 districts applied for 17 ESBs as a consortium through the Michigan Association of Pupil Transportation ESB Pilot Project

2019

Buses started rolling out in Ann Arbor, Gaylord, Kalamazoo, Oxford, Roseville, Three Rivers, and Zeeland

→ MI is leading the Midwest in ESB deployment

2020-present

It's Electric! Coalition organized and started advocating for federal and state funding by educating on the health and climate benefits of ESBs

2022-2024

BIL- EPA Clean School Bus Program (Rebates & Grant), Senate Bill 63, MI 74(b) Clean School Bus Grant



EPA Clean School Bus Program, Rebate Awardees (2022): Michigan

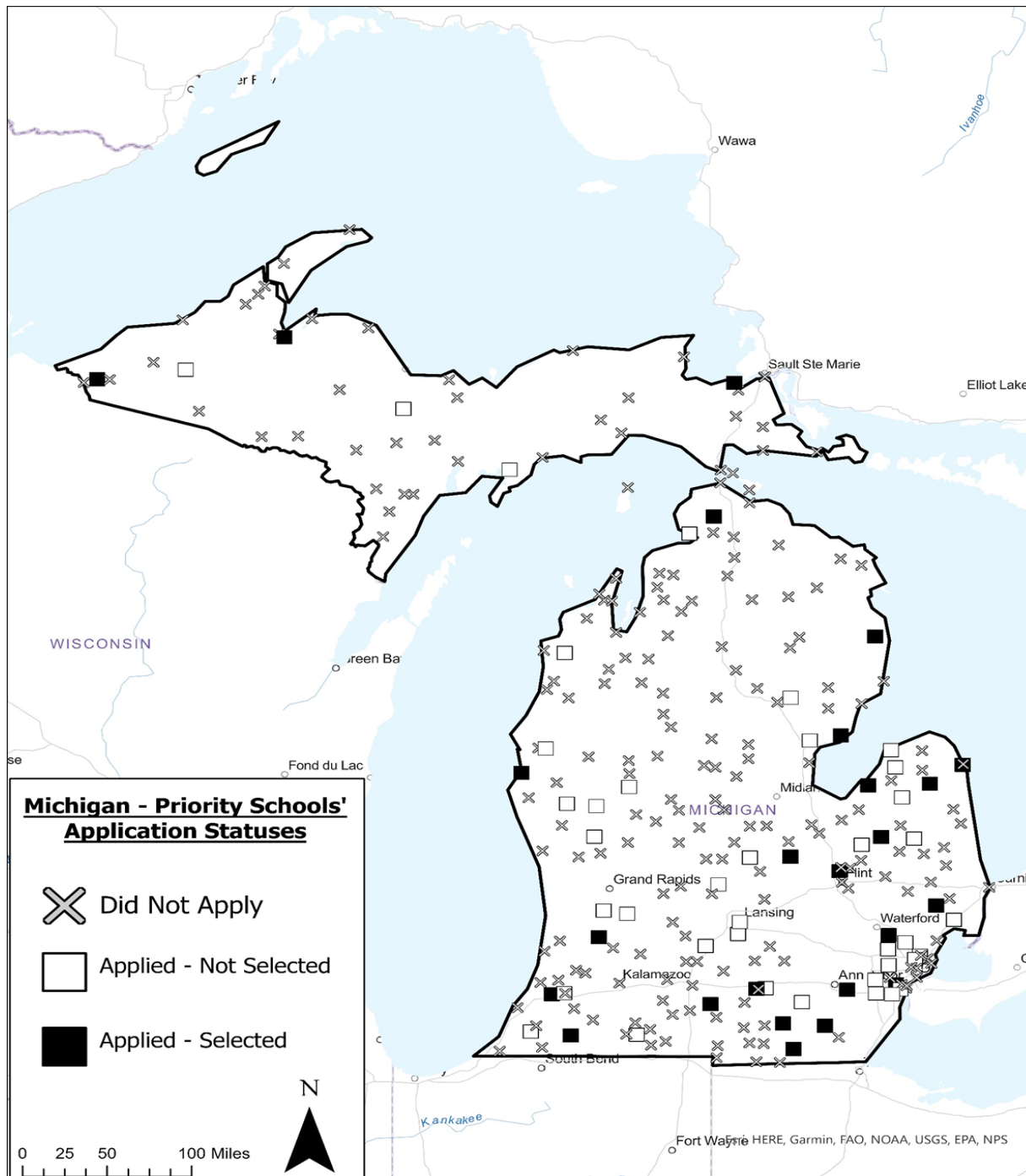
25 school districts

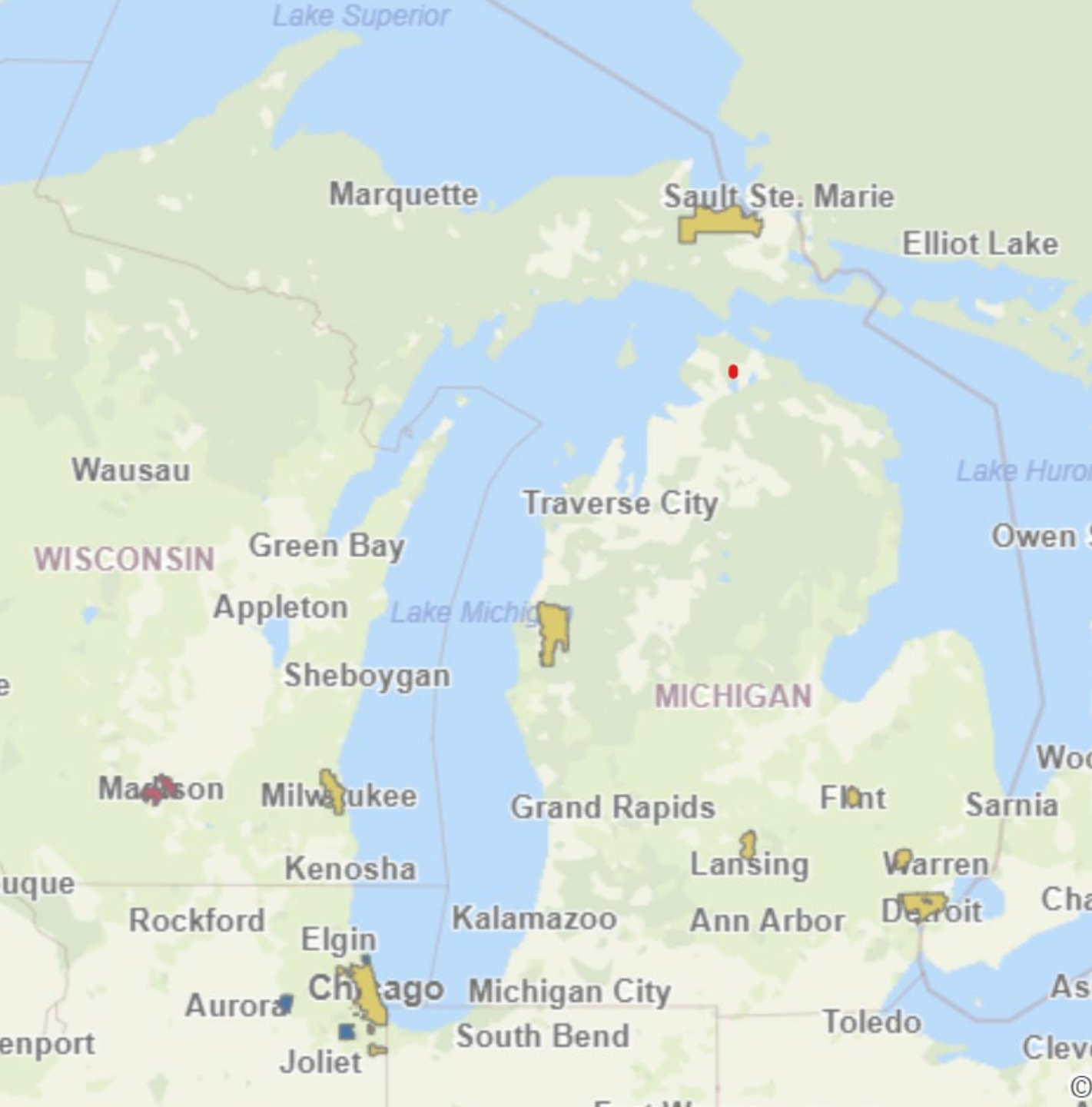
- 2nd nationally in number of school districts awarded

133 electric school buses

- 4th nationally for total funding

58 school districts were waitlisted
requesting 240 CSB (222 ESBs)





EPA Clean School Bus Program, Grant Awardees (2023): Michigan

8 school districts- 68 total ESBs

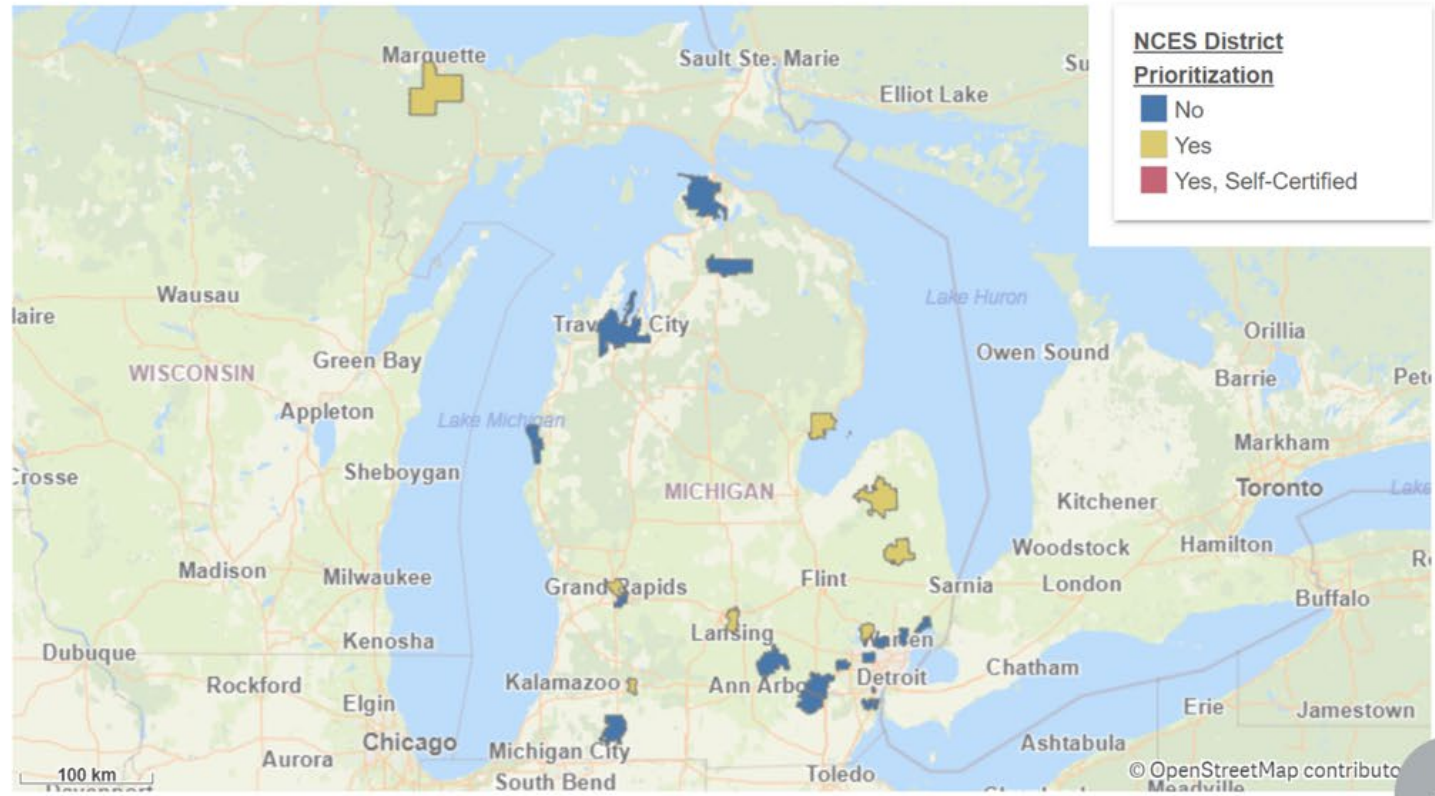
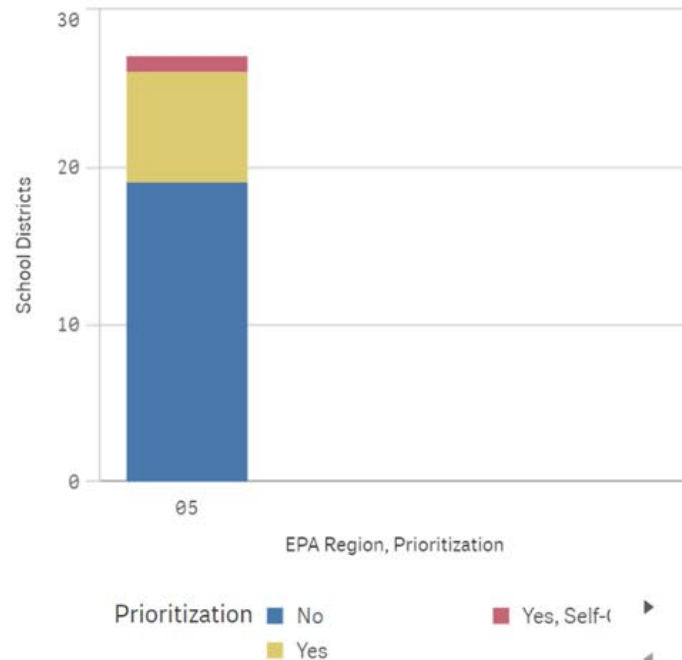
- School District of the City of Pontiac- 15
- Lansing School District- 15
- Detroit Public Schools Community District- 15
- Flint School District- 12
- Mason County Eastern Schools- 2
- West Shore Educational Service District- 2
- Brimley Area Schools- 2
- Redford Union Schools #1- 5



EPA Clean School Bus Program, Rebate Awardees (2023): Michigan 27 school districts- 100 total ESBs

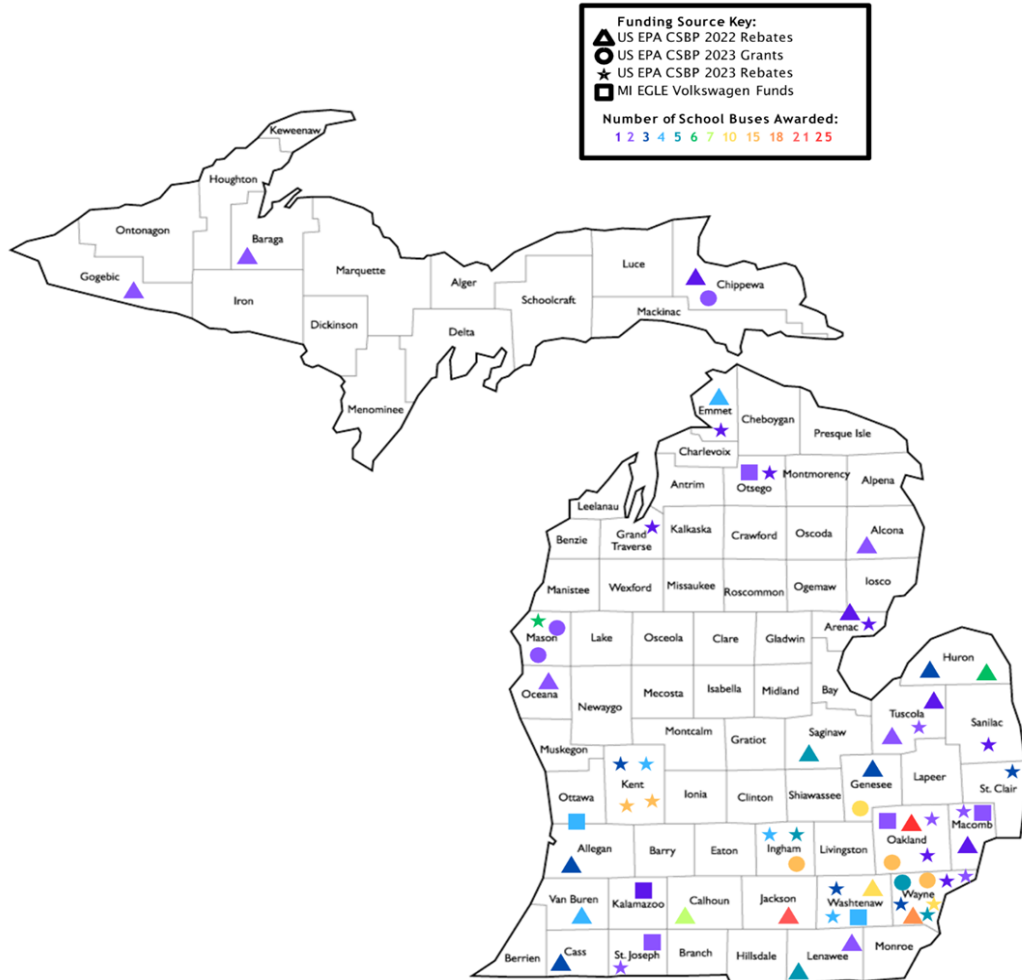
PROJECT STATUS	FUNDING YEAR	EPA REGION	SCHOOL DISTRI...	NCES DISTRICT ID	PRIORITIZATION	PRIORITIZATIO...	REPLACEMENT F...
Awarded Rebate Applications 27			School Districts Awarded 27	EPA Rebate Funding Awarded \$23,975,000.00			Buses to be Replaced 100

Awarded School Districts by Region and Prio...



Michigan Electric School Buses

To date, 314 electric school buses have been awarded to serve students in 58 school districts across the state. See the following chart for the full list of school districts. School districts with an asterisk will have a full fleet of electric school buses once buses are all delivered.



How i

Funding Source	School District	# Buses	County
▲	Alcona Community Schools	2	Alcona
★	Allen Parks Public School	5	Wayne
★	Anchor Bay School District	3	St. Clair
★	Ann Arbor Public Schools	4	Washtenaw
■	Ann Arbor Public Schools	4	Washtenaw
▲	Armada Area Schools	1	Macomb
▲	Au Gres-Sims	1	Arenac
★	Au Gres-Sims	1	Arenac
▲	Beecher Community School District	3	Genesee
▲	Bessemer Area School District	2	Gogebic
●	Brimley Area Schools	2	Chippewa
▲	Britton Deerfield Schools	5	Lenawee
★	Brown City Community Schools	1	Sanilac
★	Cass City	2	Tuscola
▲	Cassopolis Public Schools	3	Cass
▲	Chesaning Union Schools	5	Saginaw
▲	Chippewa Valley Schools	2	Macomb
★	Comstock Public Schools	3	Kent
▲	Dearborn City	18	Wayne
●	Detroit Public Schools Community District	15	Wayne
■	Gaylord Community Schools	2	Otsego
★	Grand Rapids Public Schools	15	Kent
▲	Harbor Beach Community Schools	3	Huron
▲	Hartford Public Schools	4	Van Buren
▲	Homer Community School Districts	7	Calhoun
▲	Hopkins Public Schools	3	Allegan
▲	Jackson Public Schools	21	Jackson
■	Kalamazoo Public Schools	1	Kalamazoo
★	Kent ISD	15	Kent
★	Kentwood Public Schools	4	Kent
▲	L'Anse Area Schools	2	Baraga
●	Lansing Public School District	15	Ingham
★	Lansing Public School District	5	Ingham
★	Ludington Area School District	6	Mason
●	Mason County Schools (Central, Eastern)	2	Mason
▲	Mayville Community School District	2	Tuscola
★	Northville Public Schools	1	Wayne
▲	Ojibwe Charter School	1	Chippewa
■	Oxford Community Schools	2	Oakland
▲	Pellston Public Schools*	4	Emmet
★	Pellston Public Schools*	1	Emmet
▲	Pentwater Public School District	2	Oceana
▲	Pontiac City School District*	25	Oakland
▲	Pontiac City School District*	15	Oakland
●	Redford Union Schools, Dist. No. 1	5	Wayne
■	Roseville Community Schools	2	Macomb
★	Saline Area Schools	3	Washtenaw
▲	Sand Creek Community Schools	2	Lenawee
●	School District of the City of Flint	10	Genesee
★	Southfield Public School District	1	Oakland
★	Stockbridge Community Schools	4	Ingham
★	The Dearborn Academy	3	Wayne
■	Three Rivers Community Schools	2	St. Joseph
★	Three Rivers Community Schools	2	St. Joseph
★	Traverse City Area Public Schools	1	Grand Traverse
★	Trenton Public Schools	10	Wayne
★	Troy School District	2	Oakland
▲	Uby Community Schools	6	Huron
▲	Unionville-Sebewaing Area School District	1	Tuscola
★	Vanderbilt Area Schools	1	Otsego
●	West Shore Educational Service District	2	Mason
★	Woodhaven-Brownstown School District	2	Wayne
▲	Ypsilanti Community Schools	10	Washtenaw
■	Zeeland Public Schools*	4	Allegan/Ottawa

Total Buses = 314
 US EPA CSBP 2022 Rebates = 134
 US EPA CSBP 2023 Grants = 66
 US EPA CSBP 2023 Rebates = 97
 MI EGLE Volkswagen Funds = 17

Total School Districts = 58
 US EPA CSBP 2022 Rebates = 24
 US EPA CSBP 2023 Grants = 8
 US EPA CSBP 2023 Rebates = 25
 MI EGLE Volkswagen Funds = 7



Electric school buses may yield significant health and climate benefits, cost savings

For immediate release: May 20, 2024

Boston, MA— Replacing diesel school buses with electric school buses may yield up to \$247,600 in climate and health benefits per individual bus, according to a new study by researchers at Harvard T.H. Chan School of Public Health. The researchers found that these benefits—including fewer greenhouse gas emissions and reduced rates of adult mortality and childhood asthma—and their associated savings are strongest in large cities and among fleets of old (2005 and before) buses.



Research on electric school buses

to ambient PM_{2.5}. Further research assessing benefits of reduced exposure to in-cabin air pollution among children riding buses would be valuable to inform policy decisions.

transportation | air pollution | benefit-cost analysis | climate change | risk assessment

which older, highly polluting buses are replaced positively impacts student attendance.

reduced mortality and childhood asthma total \$207,200/bus. Climate benefits amount to \$40,400/bus. These benefits

Take ACTION for ESBs!

Ask your school district to transition to electric school buses and be a resource on the health impacts of ESBs!

Share funding opportunities:

- [74\(b\) Clean Bus Energy Grant](#)- **NOW OPEN till October 12th**
 - \$125 million for clean, school buses
 - Prioritized high-need districts examining criteria like income, environmental risk factors, and rural or indigenous populations
- [EPA Clean School Bus Program](#)- Look for opportunities coming this Fall 2024

Please reach out to me if you are interested in more resources and connecting with your school districts.

Conclusion

- Air pollution is linked to several negative health outcomes and involves exposure to multiple pollutants from varying sources.
- Educating people on the risks of exposure to air pollution is important- especially for those living with asthma as our climate is changing.
- Please encourage people to monitor the AQI and plan accordingly.
- There are actions you can take to bring cleaner air to your communities!
- Ask your school district to consider electric school buses to improve air quality and decrease climate pollution for students, drivers and the surrounding community.

Questions?



Please reach out with any questions or comments.

Kindra Weid, RN, BSN, MPH
Coalition Coordinator MI Air MI Health and *It's Electric!*
kindra@miairmihealth.org