



Fresh Air For Kids

2023/2024 Report

Clean Air Hamilton, September 09, 2024

Denis J. Corr, Ph.D., Corr Environmental Inc

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Vision

Committed to improving the health and quality of life of citizens through communication and promoting realistic, evidence-based decision-making and sustainable practices

Goals

- *supporting educational programs relating to air quality improvement.*
- *identifying and pursuing actions and initiatives that will support air quality improvement, and the achievement of air quality objectives in Hamilton, for example, meeting Ontario's Ambient Air Quality Criteria, and the Canadian Ambient Air Quality Standards.*
- *encouraging and facilitating increased use of public and active transportation through commentary on transportation related matters, supporting educational programs and localized monitoring leading to detailed information to encourage changes in behaviour.*

Province of Ontario's Grade 1-8 Science Curriculum Vision and Goals

- Emphasize the importance of STEM Education
- Foster Curiosity and Wonder in Science and Technology.

Fresh Air For Kids (FAFK) is an innovative, forward looking, positive combination of air quality science with school and community outreach.

The program educates students about air quality, climate change and science-based approaches, as well as empowering them to protect themselves and assist others by improving air quality.

It is implemented as a cooperative endeavour between students, teachers, Corr Environmental, the Ministry of Environment Conservation and Parks (MECP) and Clean Air Hamilton (CAH).

Program Content:

Fresh Air For Kids 2023/2024 consists of:

- Air quality risk mapping of local school neighbourhoods
- In-class presentation by an air quality scientist, educating students about air quality, air pollution and climate change, with a positive and personalized approach,
- "Best Ways to Get to School" exercise using the previously developed neighbourhood maps for students
- Questionnaire challenging students as to how best to minimize their personal exposures as well as performing actions to improve air quality
- Neighbourhood "walkabout" with a handheld air pollution monitor to measure local sources
- Anti-Idling module
- Connecting teachers with the City of Hamilton's "Schools for Active and Sustainable School Travel" program

In the 2023/2024 school year, Fresh Air for Kids was brought to:

- 4 schools
- 15 Principals, Teachers and 326 students in Grades 2 through 7
- Schools were Marguerite d'Youville, Regina Mundi, St. Joseph and St. David Elementary Schools

IN CLASS PRESENTATION

The image features a solid blue background with a gradient from light blue at the top to a darker blue at the bottom. In the lower right quadrant, there are several thin, white, parallel lines that create a sense of motion or a stylized graphic element, extending from the bottom edge towards the top right corner.

Fresh Air For Kids

Dr. Denis Corr, Corr Research / Dimitri Corr, FAFK, Ste.M. D'Y



St. David Catholic
Elementary School

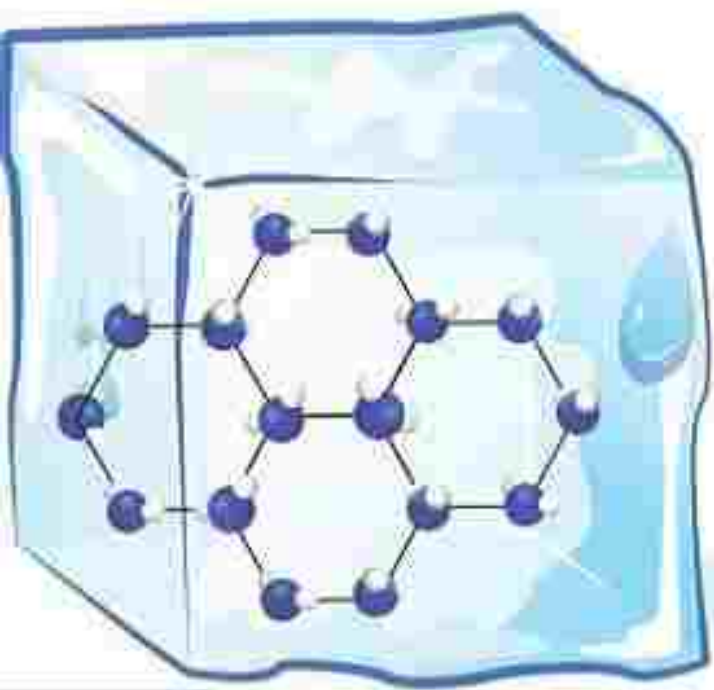


Mr. Ciapanna, Ms. Fiorino, Ms. Lamparski





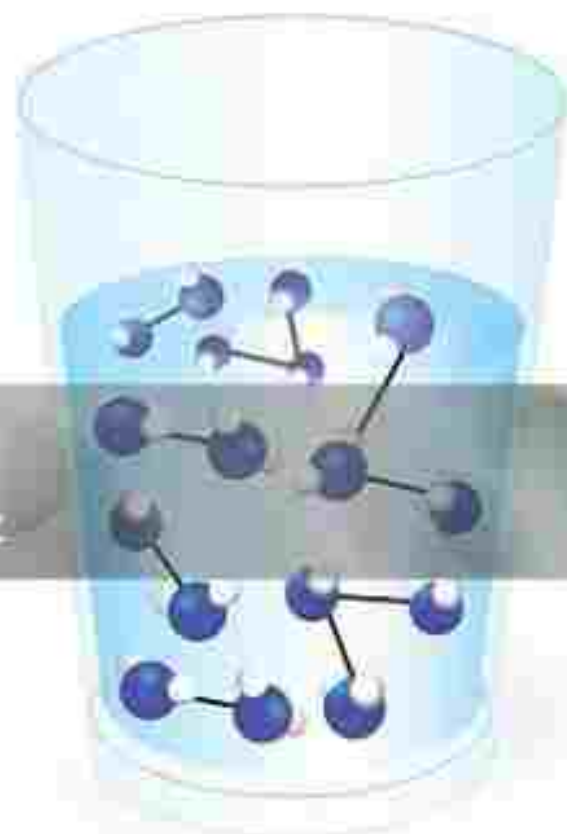
Solid



Gas



Liquid



iStock
Credit: ttsz

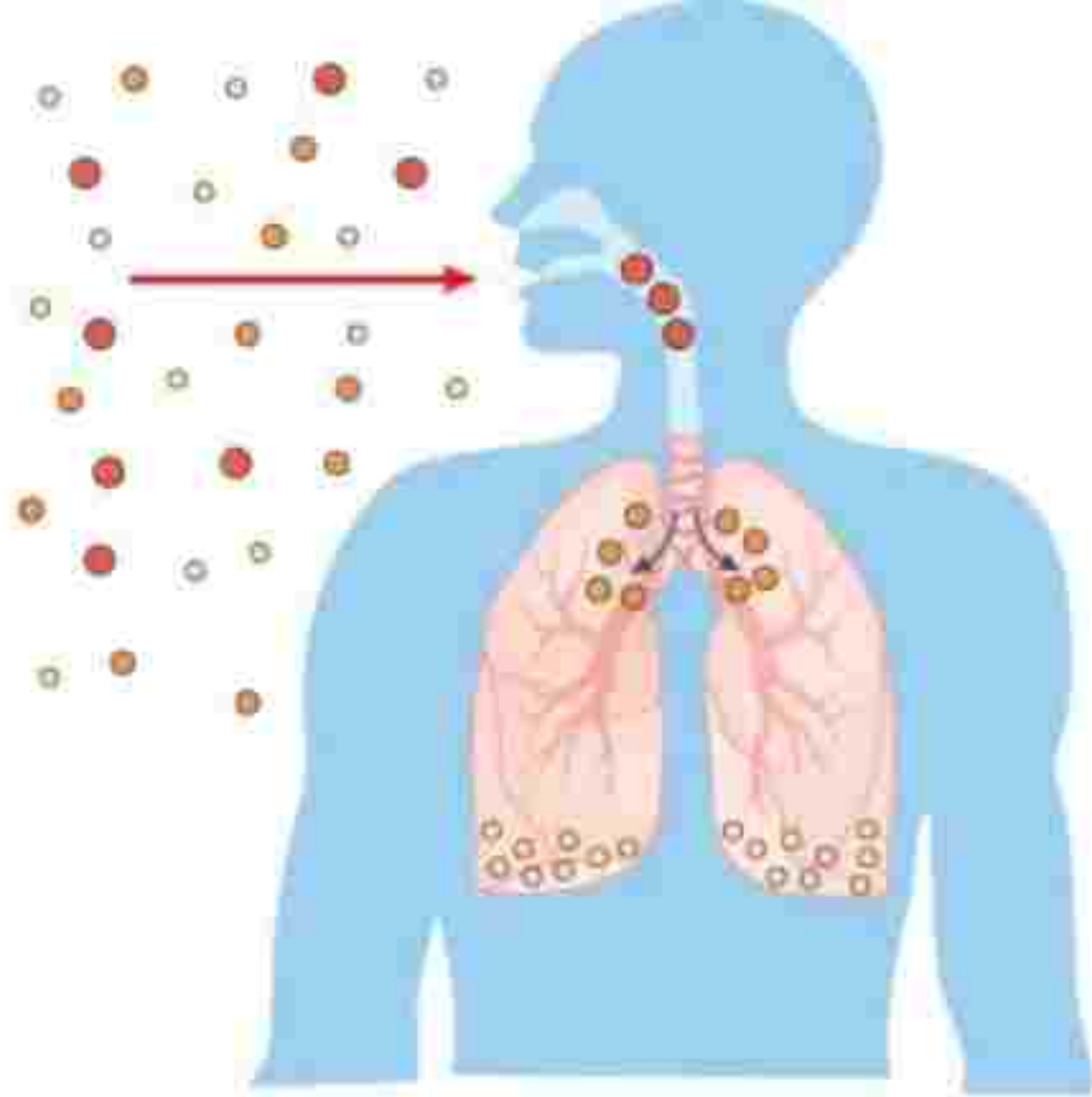
AIR POLLUTION

CAN BE GASES OR PARTICLES

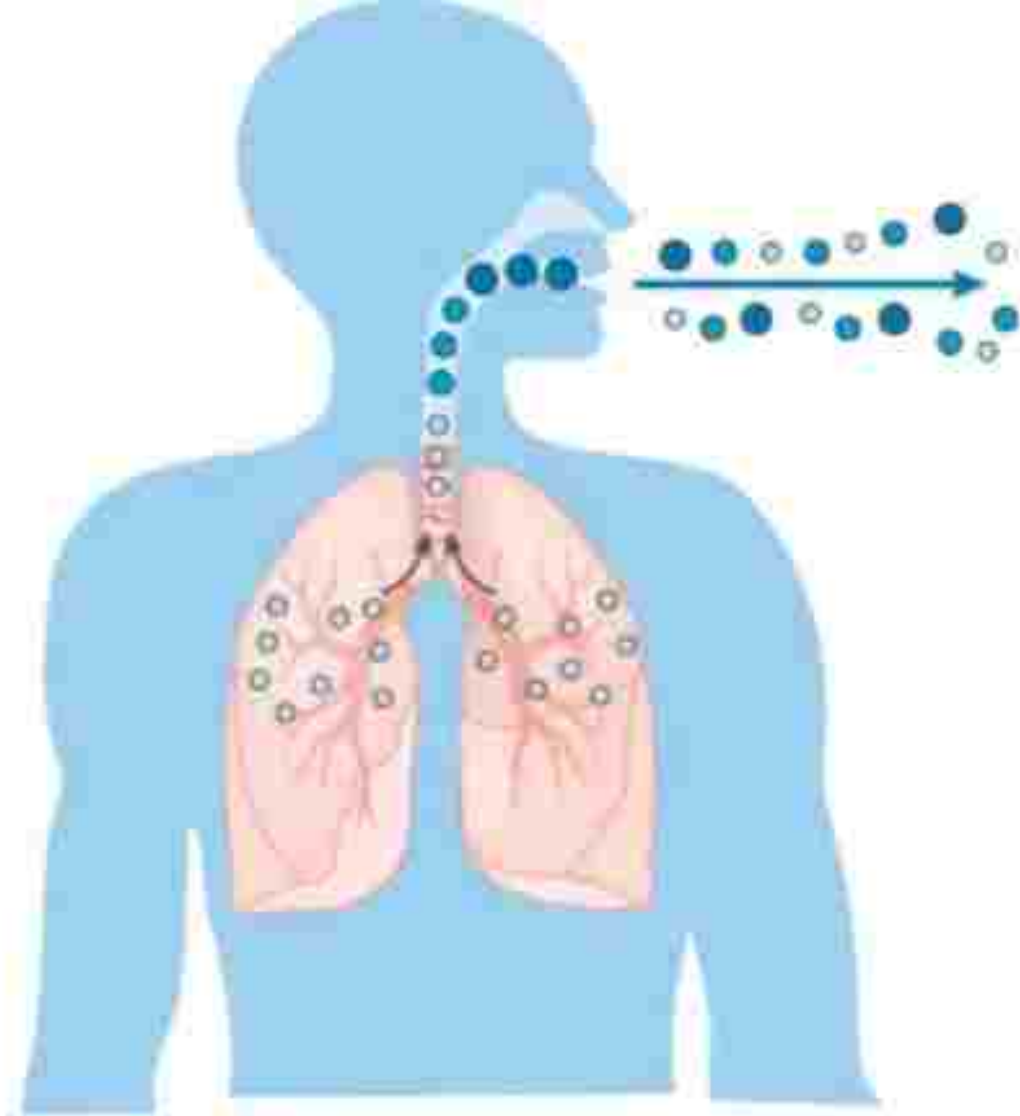
OR

BOTH

A decorative graphic consisting of several parallel white lines of varying thicknesses, slanted diagonally from the bottom right towards the top right, set against a blue gradient background.

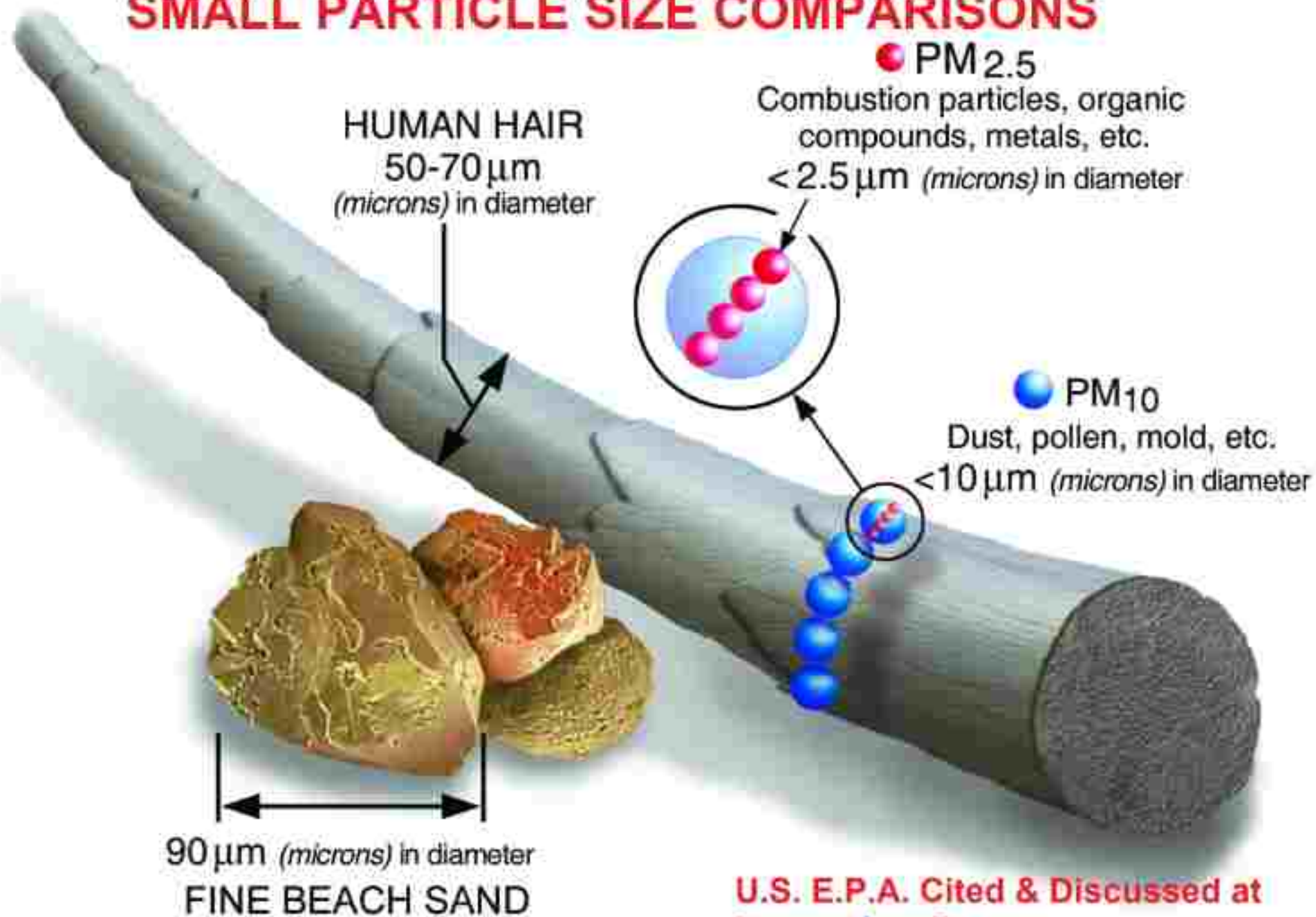


- 0.1 μm particle deposited in the alveolar region
- 2.5 μm particle deposited in the lung
- 10 μm particle deposited in the mouth



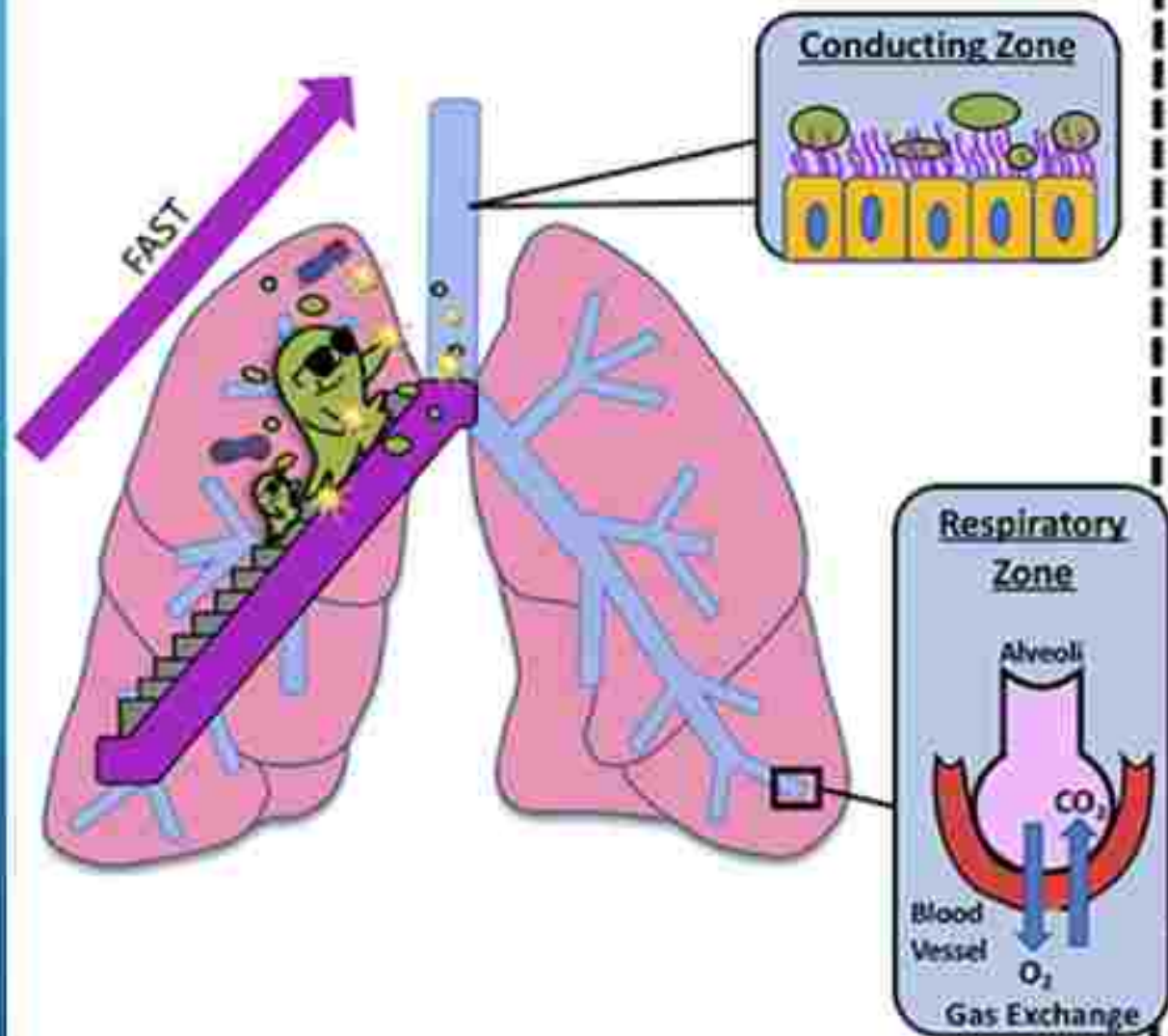
- 1 μm particle generated in the bronchioles
- 5 μm particle generated in the larynx
- 50 μm particle generated in the mouth

SMALL PARTICLE SIZE COMPARISONS

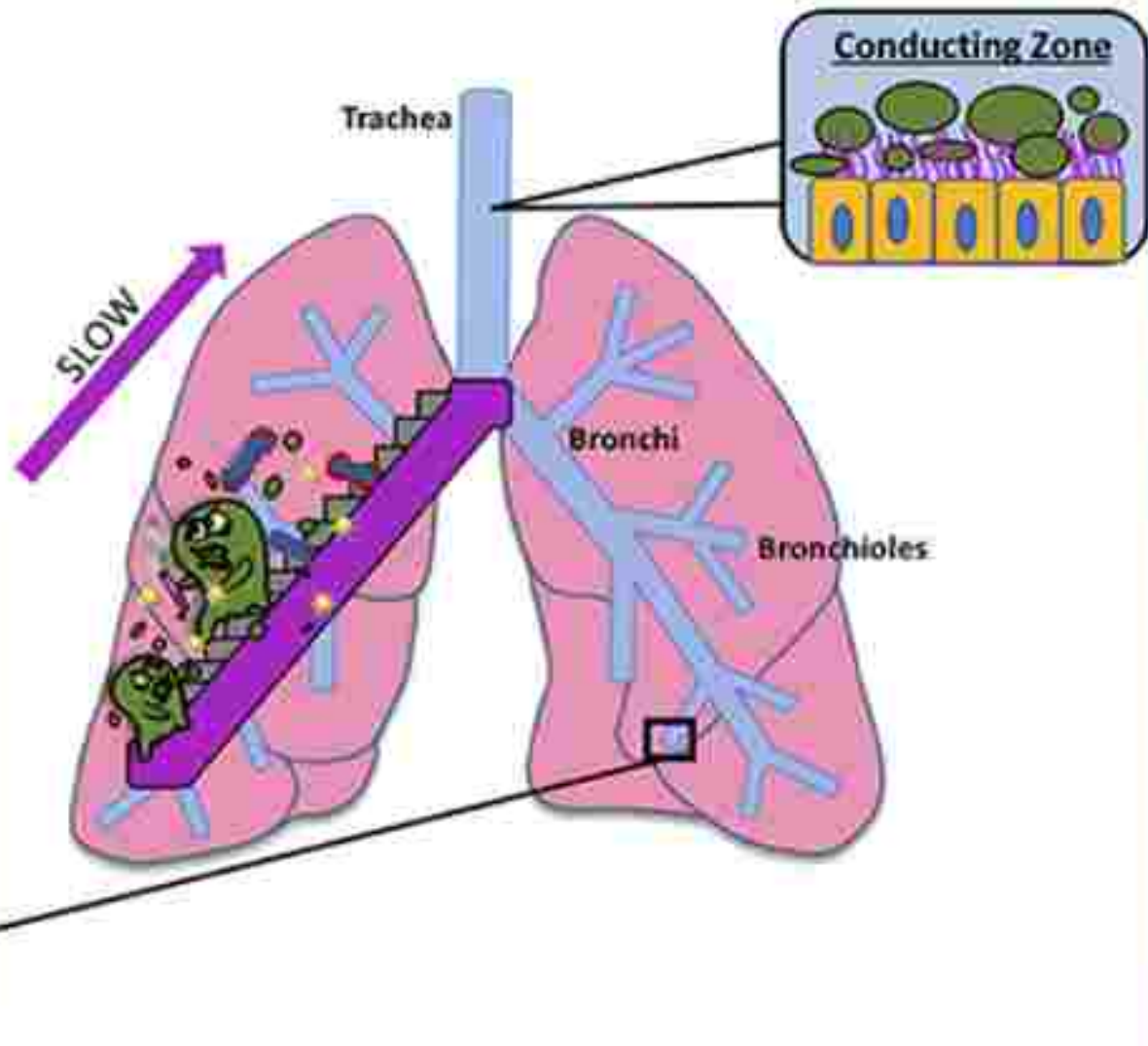


U.S. E.P.A. Cited & Discussed at
InspectApedia.com

HEALTHY MUCOCILIARY ESCALATOR



UNHEALTHY MUCOCILIARY ESCALATOR



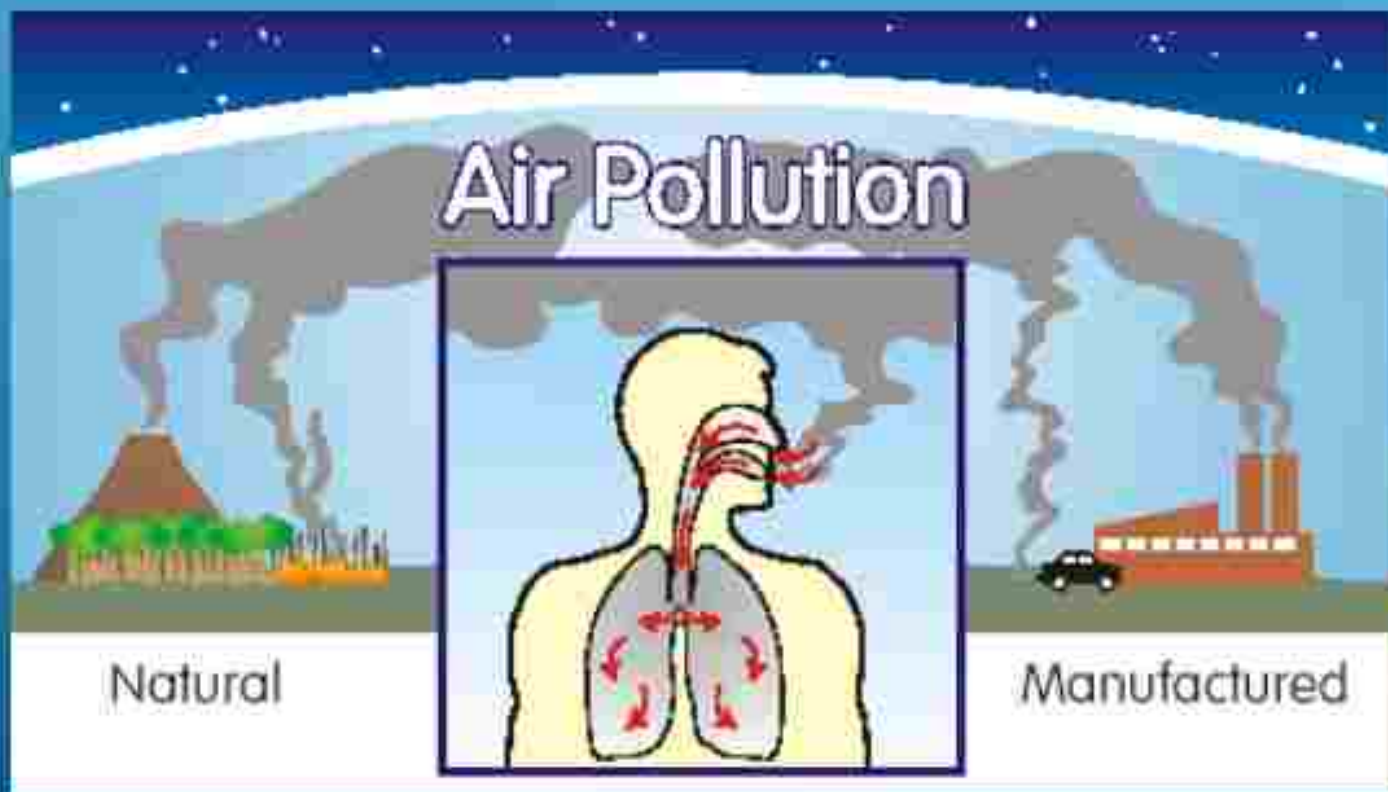
WHERE DOES AIR
POLLUTION COME FROM ?

A decorative graphic consisting of several thin, parallel white lines that originate from the bottom right corner and extend diagonally towards the top right corner of the slide.

AIR POLLUTION

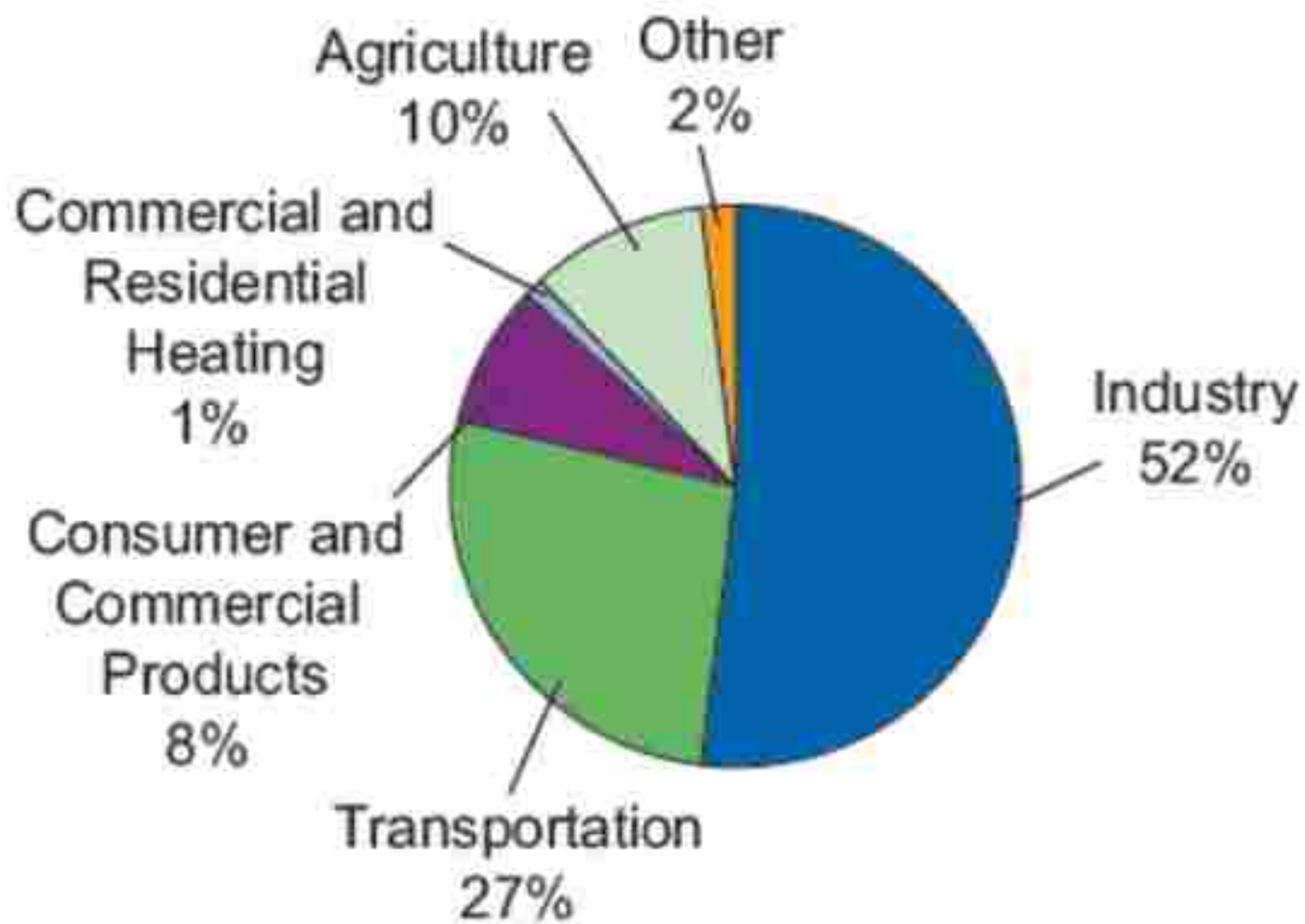
NATURAL VS. HUMANMADE

BIOGENIC VS. ANTHROPOGENIC



Biogenic air pollutant sources from volcanic activity, forest fires, windstorms and plants (pollen) can regularly cause air pollution episodes but.....it is our human activities that really overwhelm our atmosphere with pollutants.

Sources of Emissions of Air Pollutants

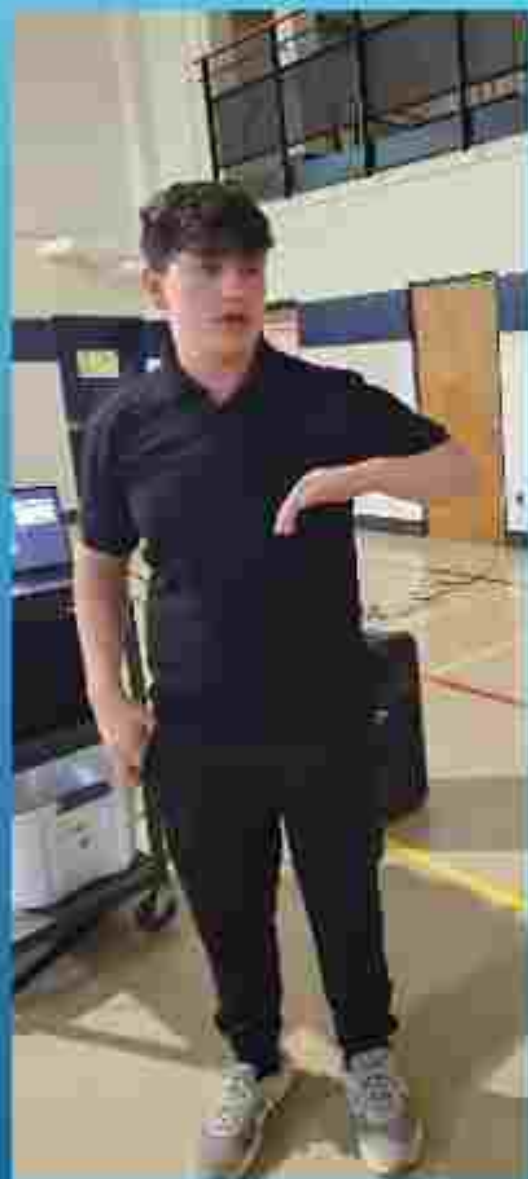


BUT

WITHOUT SOME PARTICLES IN THE AIR
THERE WOULD BE NO CLOUDS!!!!

CLOUDS

The image features a solid blue background with a vertical gradient, transitioning from a lighter cyan at the top to a darker blue at the bottom. The word "CLOUDS" is centered in the upper half in a white, sans-serif font. In the bottom right corner, there are several thin, white, parallel lines that appear to be part of a larger graphic element or a design flourish.





Cumulus – fair weather



AltoCumulus – Thunderstorms later in afternoon



Cumulonimbus – anvil shape, pointing in direction it's moving -bring most dangerous weather, rain, lightning, hail and tornadoes.



**Cirrus – change in the weather and wind direction,
system coming in with rain, 1 to 2 days later**

And

Aerosol particles have
useful applications





©2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 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PICTURES OF WHERE PARTICLES GO IN THE LUNGS

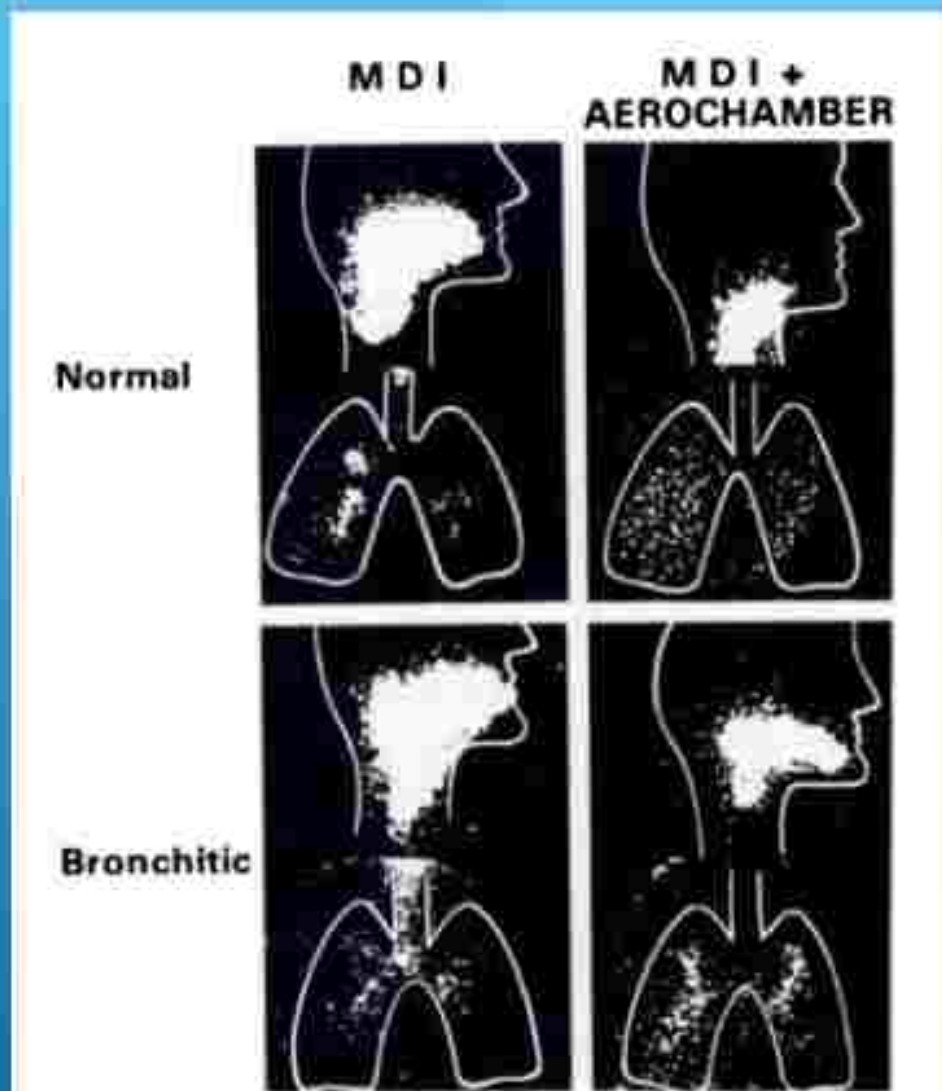


FIGURE 2. Examples of scintiscans showing relative distribution in lung, pharynx, and larynx in both groups of subjects after inhalation from MDI alone and from breath-actuated device (Aerochamber) attached to MDI. Whole right lung and only portion of left lung are visible in scintiscan.

SO, HOW ARE WE DOING
WITH OUR AIR QUALITY
HERE IN ONTARIO?

A series of several parallel white lines of varying thicknesses, slanted diagonally from the bottom left towards the top right, set against a blue gradient background.

PRETTY GOOD, ACTUALLY!

A series of several thin, parallel white lines that originate from the bottom right corner and extend diagonally upwards towards the top right corner of the image.

Signs of Hope

Ontario's clean electricity – 80% of the electricity we use is clean.

Closure in 2013, (Dalton McGuinty, Premier) and demolition of largest coal
burning power station in North America, Nanticoke Generating Station.



<https://www.youtube.com/watch?v=8OF5bZAFEvU>



Tesla is a major force in electric auto manufacturing.

GM is on its way to an all-electric future, with a commitment to 30 new global electric vehicles by 2025.

Unfortunately a \$2Bn investment in Ford Oakville plant to produce 5 models of electric cars has now been changed to pickup trucks.

Toyota, having built hybrids for many years is now moving to all electric and hydrogen fuelled

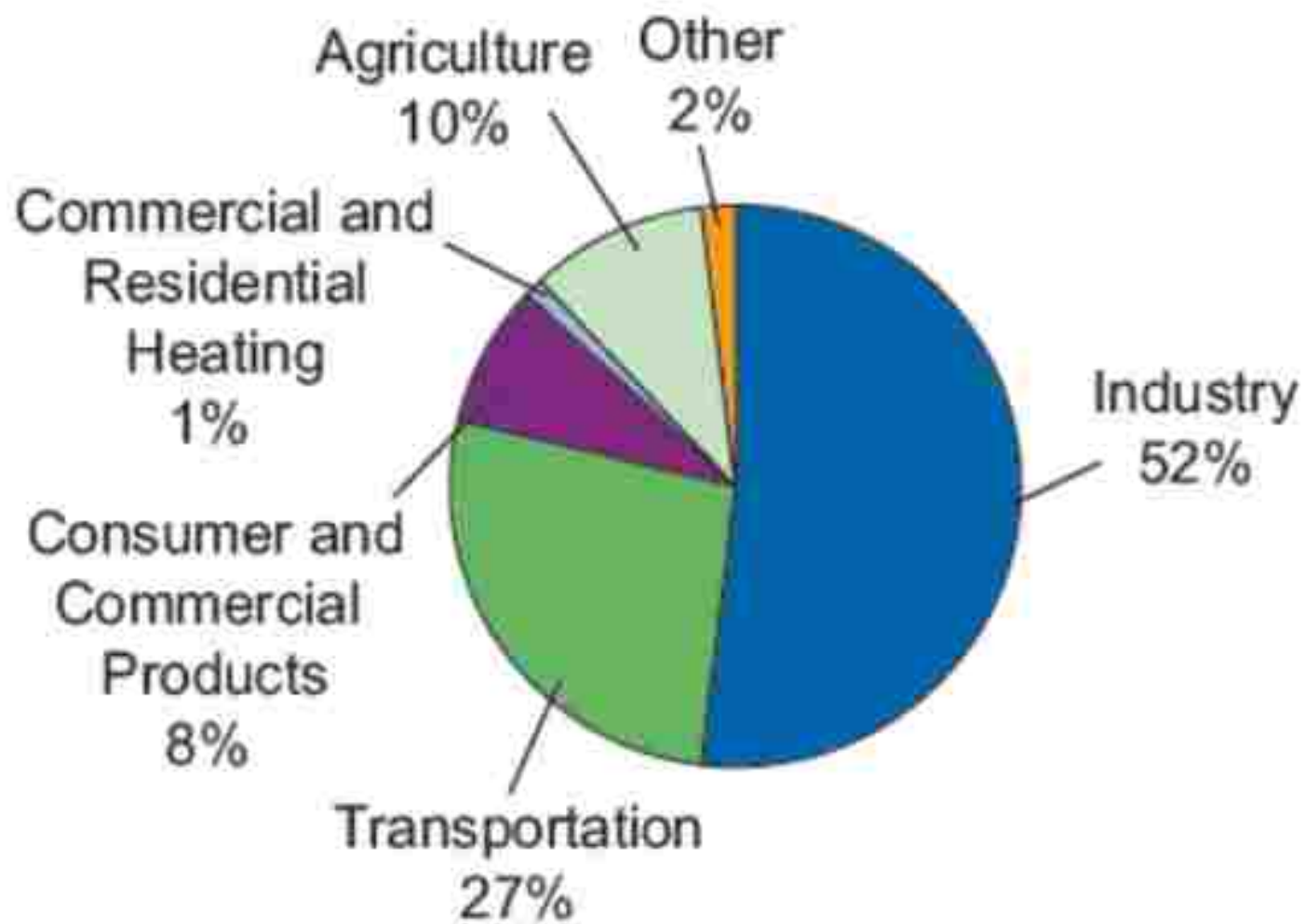
Prototype electric "flying cars" now operating, including Toyota, Airbus, others.



Original eVTOL aircraft designs are being developed by manufacturers as Airbus, Boeing, Embraer, Honda, Hyundai, and Toyota, as well as several start-up companies including Archer Aviation, EHang, Joby Aviation, Overair, and Volocopter.



Sources of Emissions of Air Pollutants





Industry

Arcelor Mittal Dofasco steelmaker announced a \$1.8-billion proposal last year to replace its aging coke ovens and blast furnaces with electric arc furnaces by 2028 — then switch to hydrogen based steel making.

These changes will dramatically cut greenhouse gas emissions as well as cancer-causing air pollution and black fallout in nearby Hamilton neighbourhoods,

The Federal and Provincial governments will contribute \$400 million and \$500 million to this project.

Forty years ago, solar panels cost \$77 per watt of capacity. Today's price of 13 cents per watt represents approximately 1/600th of the old cost.



Leaders Summit on Climate hosted by the President of the United States of America, Joe Biden, on April 22 and 23, 2021.

"Climate change is one of the greatest threats we face as a world, but it also presents an enormous economic opportunity"

Trudeau promises to slash emissions by up to 45 per cent by 2030 after Biden pledges 50 per cent

ONEIDA ENERGY STORAGE

Oneida Energy Storage (OES Project) is a 250 MW/1000 MWh battery storage facility, which has the potential to absorb surplus electricity from the Ontario power grid during off-peak hours, in order to return it to consumers when it is needed the most.

- Up to \$760M net savings to ratepayers*
- 4.1 Million tonne reduction in CO₂*
- Over 900,000 hours of local employment*
- Significant Indigenous ownership in low carbon infrastructure assets
- OES Project would be the first project ENORDC has co-developed as a partner
- OES Project will be among the first of its size, and will be an example of how Indigenous partners can participate in building a sustainable future

*over the 20-year life of the asset

\$800 Million



AECON

TESLA

Per-Capita CO₂ Emissions by Region





Re-Charge
Adapt
Exchange
ACT

HAMILTON'S
**CLIMATE ACTION
STRATEGY**

ANNUAL UPDATE 2024

October 2024




Here in Hamilton

It is estimated Hamilton's community-wide emissions have been reduced by approximately 37.0% since 2006.



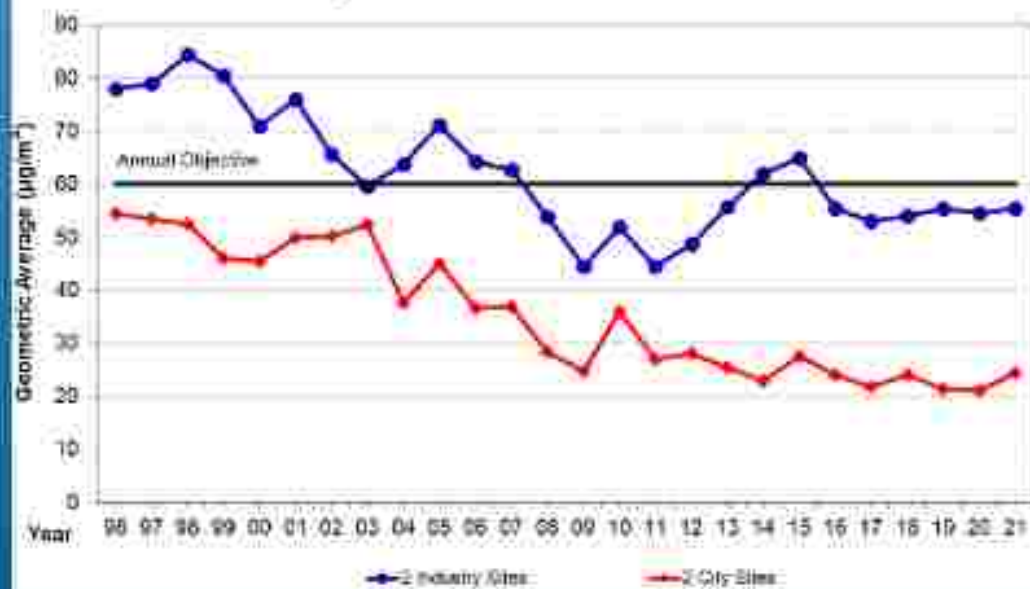
But what about the air we're breathing
right now, here in Hamilton?

A series of white lines of varying thicknesses and lengths, all oriented diagonally from the bottom-left towards the top-right, set against a blue gradient background.

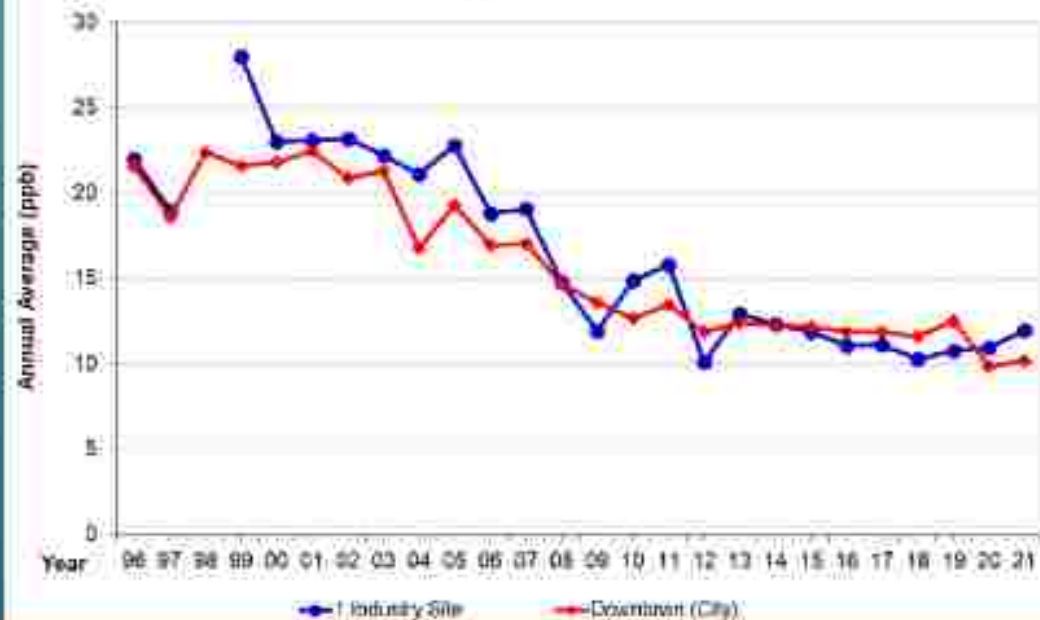
Hamilton's Air Quality Trends



Suspended Particulate Matter Trend

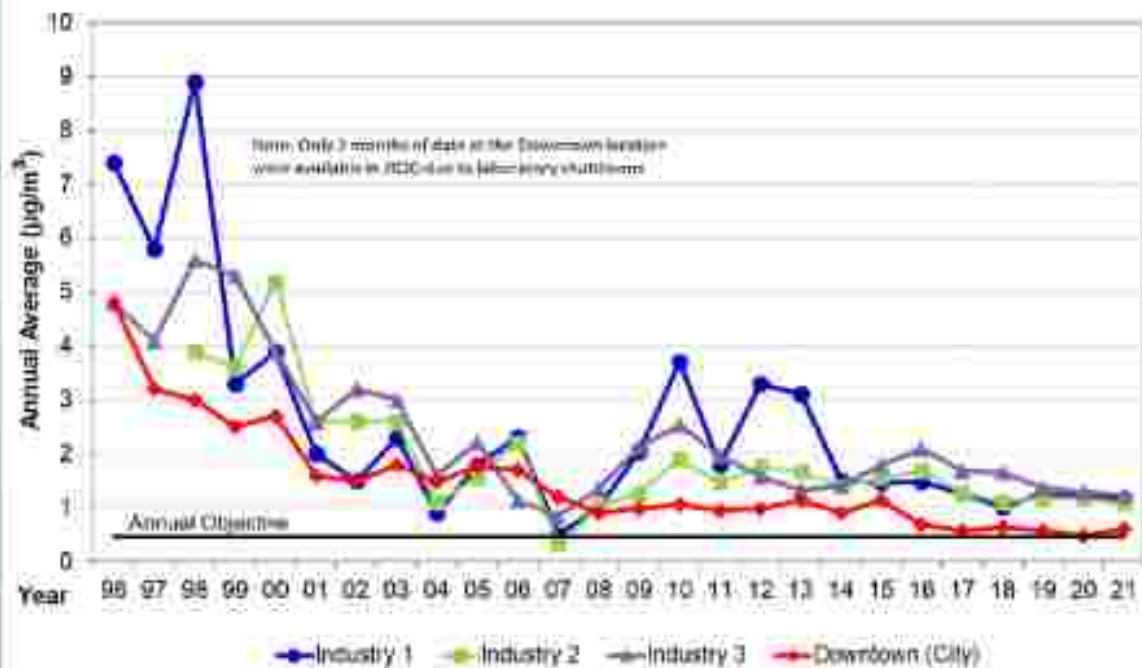


Nitrogen Dioxide Trend

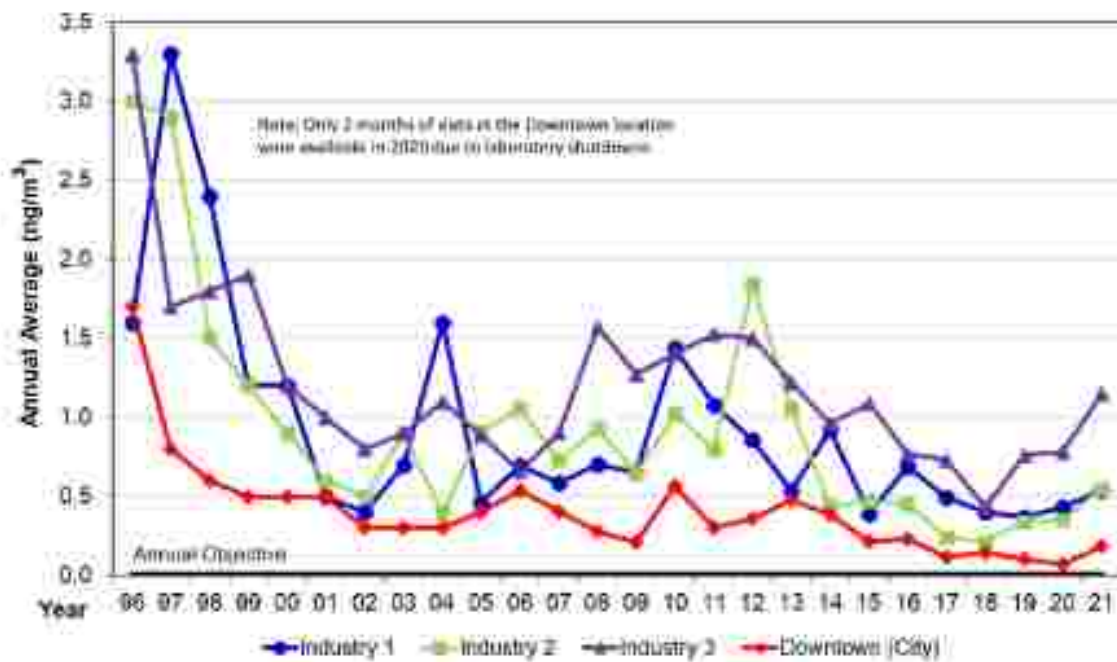


Hamilton's Air Quality Trends

26-year Trends for Benzene



26-year Trends for Benzo[a]pyrene



Hamilton wins
United Nations Award

Best Practice Worldwide
Improving City Air Quality



**WHICH AIR POLLUTION AFFECTS US MOST
HERE IN HAMILTON?**

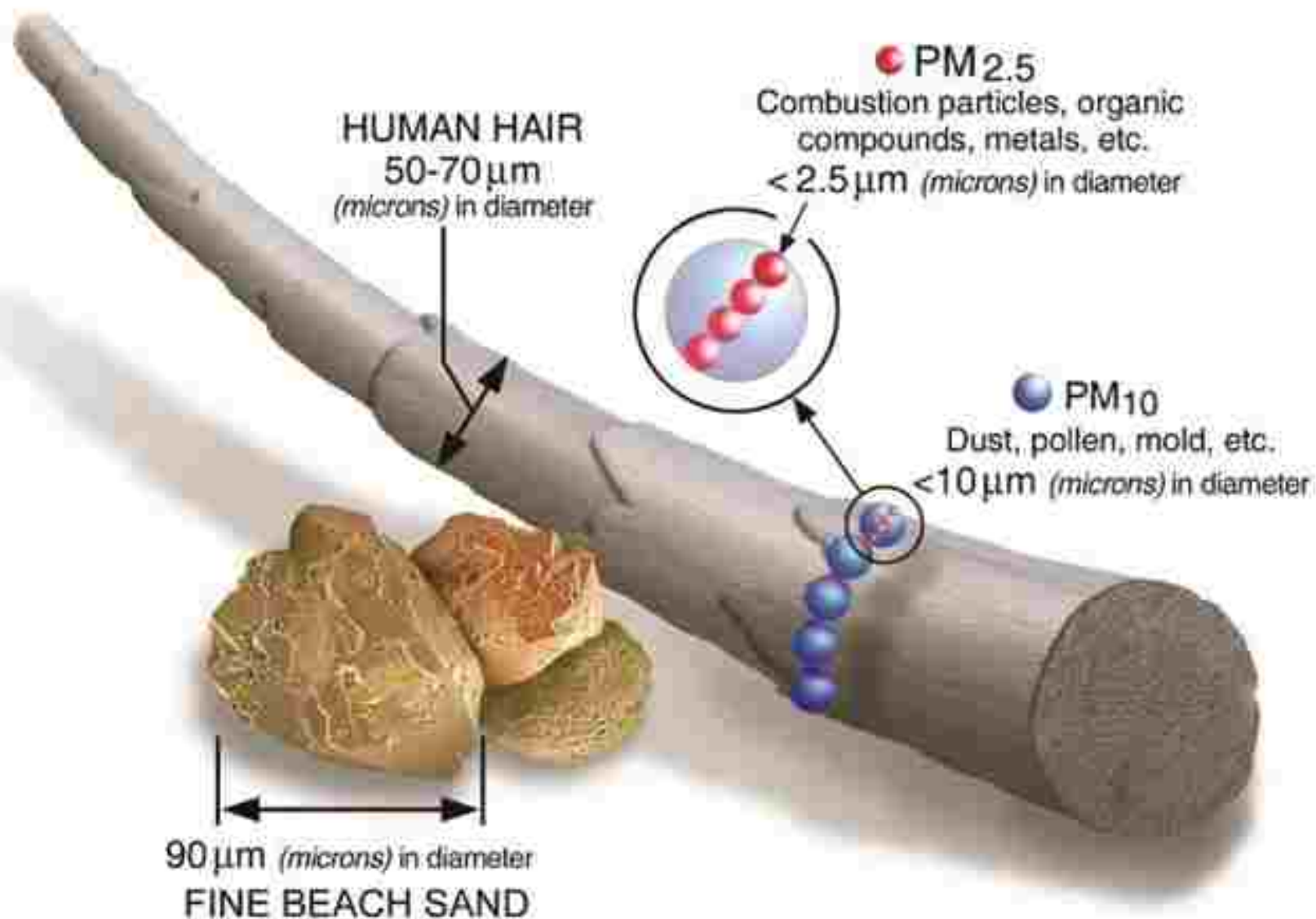




INSTRUMENTATION, PM10, PM2.5, NOX, SO2, CO, GPS



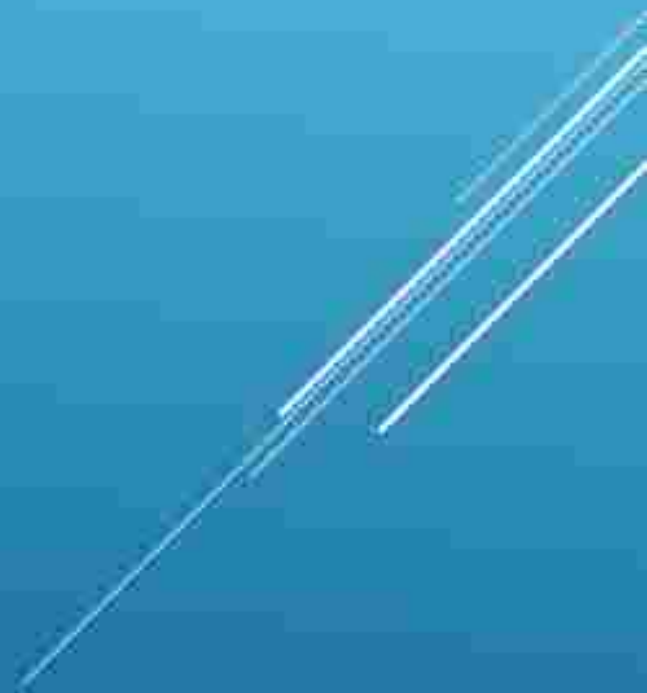
Particulate Matter (PM_{2.5} & PM₁₀)



Transportation









Dytos



Temtop



WE'LL DO OUR OWN AIR MONITORING
AROUND ST. DAVID SCHOOL!



FIND OUT THE BEST WAY
TO GET TO ST. DAVID SCHOOL





Best Air Quality Ways To Get To St. David School

St. David School, Mobile Air Monitoring, Close up



St. David School



% Air Quality Risk



Find your home on the map.

PROJECT

You will need two different coloured pens.

What is the better way to go to school from your home to breathe better air?

Draw on the map using one colour.

What is the not so good way to go to school from your home to breathe better air? Draw on the map using the other colour.

Label the colours, the one which is better and the one which is not so good.

What can you do to help make the air quality better?

What can you do to breathe less air pollution?



What can you do to make the air quality better?

Walk/bike, 46

Stop vehicle idling, 14

Plant trees, 10

Drive less, 9

Carpool/use less gas, 4

Use electric car/bike, 3

Put up posters, 2

Pick up litter, 2

Use better route to school/avoid highway, 2

Make a facility to flush out air pollutants, 2

Replace old air conditioner, 1

Tell people, 1

Use recirculate on car, 1

Use air purifier, 1

Warn adults so they vote and protest, 1

What can you do to breathe less air pollution?

Use better route to school/avoid highway, 40

Walk/bike, 15

Use recirculate on car, 7

Wear mask, 6

Avoid intersections, 4

Breathe less, 4

Stay near trees, 2

Stay home, 2

Carpool/use less gas, 1

Use air purifier, 1

Clean filter on A/C, 1

Avoid bad air, 1

FIND OUT WHAT THE AIR
QUALITY IS LIKE EACH DAY

THE AIR QUALITY HEALTH INDEX

[Air Quality Ontario](#) > [Air Quality Health Index \(AQHI\)](#)

Air Quality Health Index (AQHI)

▶ [Current AQHI Observations and Forecasts](#)

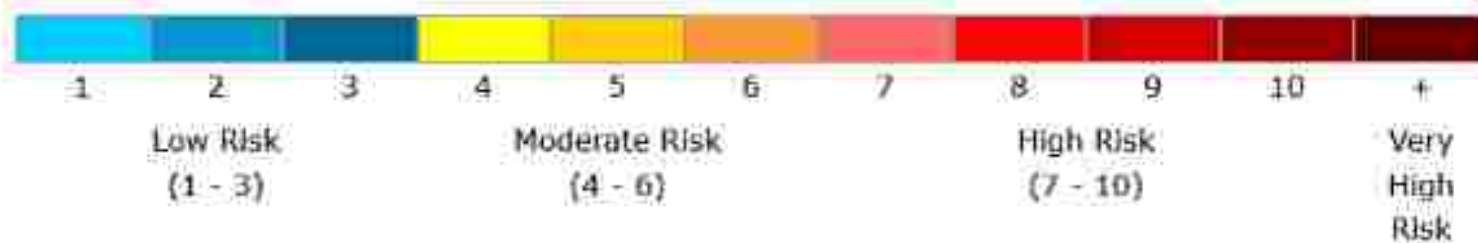
▶ [Map: AQHI Observations by Location](#)

▶ [Table: AQHI Observations by Location](#)

▶ [Search AQHI Historical Data](#)

Air Quality Health Index (AQHI)

Air Quality Health Index Categories, Values and Associated Colours



AQHI Observations and Forecasts

- Current AQHI calculated at 10:00 pm EDT May 13, 2024
- Environment Canada location AQHI forecasts updated at 5:00 pm EDT May 13, 2024

Current and Forecast Air Quality Health Index for Ontario

ANTI - IDLING PROJECT





SCHOOL STUDY
MORNING – IDLING VEHICLES

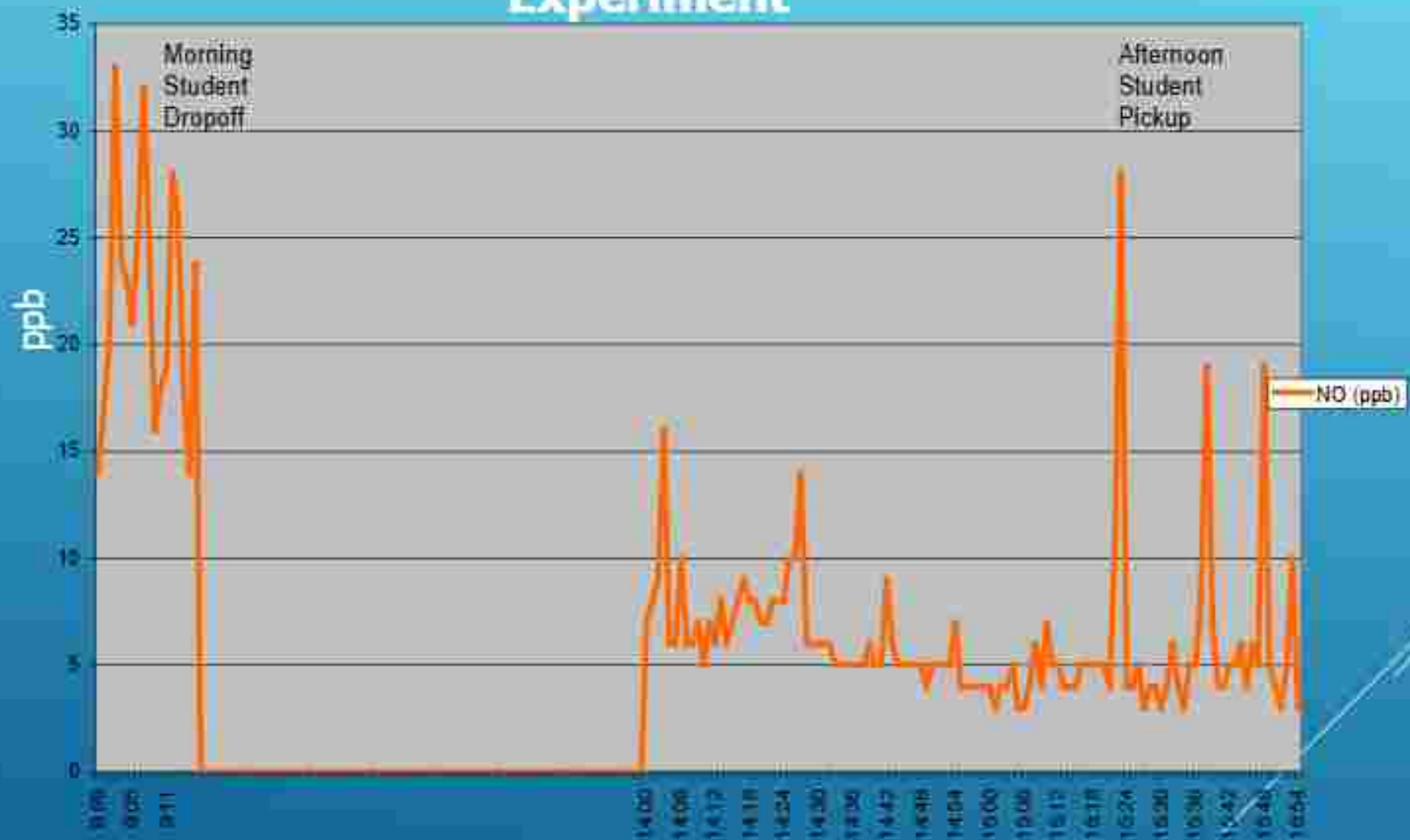


MONITORING VEHICLE AT SCHOOL



AFTERNOON – VEHICLE ENGINES OFF

Natural Experiment





“Schools for Active and Sustainable School Travel”

City of Hamilton program



VOTE
AND
SAVE ENERGY

A decorative graphic consisting of several parallel white lines of varying lengths, slanted diagonally from the bottom right towards the top right, located in the lower right quadrant of the image.