



Chicago's Troubling Air Quality

New Policy Responses

Environmental Research Group

University of Chicago

May 2024

Table of Contents

Table of Contents	2
Executive Summary	3
Air Pollution in Chicago	4
Impacts of Air Pollution	4
Health Impacts	4
Economic Impacts	5
Racial Disparities and Environmental Justice	6
Causes of Air Pollution	7
Taxonomy of Pollutants	8
Particulate Matter	8
Ozone	9
Nitrogen Oxides	10
Sulfur Dioxide	10
Carbon Monoxide	11
Indoor Pollutants	11
Measuring Air Pollution: Air Quality Index (AQI)	12
Legislative Landscape	12
Clean Air Act	12
Chicago's Climate Action Plan	12
Air Quality Ordinance	14
Policy Solutions	14
Clean Air Act Designation	16
References	18

Executive Summary

Air pollution is a pressing issue for Chicagoans, with detrimental health and economic effects. Many of these effects are disproportionately felt by low-income and minority communities. In order to understand the mechanism of this problem, and how best to resolve it, we performed dozens of literature reviews, reviewing data, policies, and case studies. Our initial focus was quantifying the harm of air pollution, followed by understanding some of the current successful policy solutions. We then performed a deep examination of Chicago's current air pollution policy to highlight areas of improvement. The biggest weaknesses of Chicago's policy included a lack of specific metrics comparable to other cities and a lack of resources for regulation and enforcement. Chicago does have effective environmental policies listed in the Chicago Action Plan, however, it is not backed by any legal force or manpower to support the initiatives that Chicago needs. Increasing funding to the newly reformed Chicago Department of the Environment would lead to greater enforcement of the policies Chicago does have, leading to reductions in air pollution and other environmental benefits.

Outside of increasing funding for the Department of Environment, our recommendations for the city of Chicago rely on leveraging existing legislature to promote the long-term sustainability of the city, which will bring air pollution reductions as co-benefits. The Chicago Climate Action Plan should serve as a guiding principle for Chicago's decisions. This does not mean that each decision should just follow a rulebook and each action will require a tailored approach, taking care to reduce the air pollution not just move them. The Clean Air Act should also be utilized to limit the air pollution created by Chicago in a more direct way. Despite a history of severe ozone pollution, EPA currently designates Chicago as in attainment for ozone and other pollutants, there is evidence that the air pollution from Cook County is causing neighboring counties in Illinois and Wisconsin to be designated as nonattainment regions. These regions face more restrictive air pollution regulations, and there is precedent for redesignating Chicago as a nonattainment region. Doing so would force Illinois to amend its State Implementation Plan for the Clean Air Act to require stricter air pollution control permits going forward (called Title Vs and Nonattainment NSRs). Finally, Chicago should look to join other cities that are outperforming on air pollution. Addressing air pollution now future-proofs a city for coming generations and is an important step in achieving environmental justice. The vast majority of these changes will stem from public officials, but businesses and the general public must be included as well.

Air Pollution in Chicago

In June 2023, the city of Chicago experienced an apocalyptic haze and the worst air quality of any city in the world.¹ Wildfire smoke from Quebec, Canada spread across the northern United States, causing widespread disruptions to daily activity. In Illinois, the state environmental agency issued an advisory urging all people to stay indoors while the smog crossed the region.² While this wildfire was anomalous, its far-reaching effects illustrate the vital role that air quality plays in Chicago's daily function.

On a more regular basis, air quality directly impacts the health and economic well-being of people living in Chicago. The city was recently ranked the 17th and 23rd worst city by ozone and year-round particle pollution, respectively.³ Data shows that Chicago's low-income residents and minority communities face a high risk of exposure to polluted air.

Impacts of Air Pollution

Health Impacts

Air pollution is just as bad for respiratory health as smoking. Toxic levels of air pollution lead to acidosis, leaving people with reduced desires to engage in physical activity, as well as more serious problems such as pneumonia, heart attacks, and strokes.¹ In many cases, air pollution can exacerbate existing health problems which raise the comorbidity of exposure.

Types of air pollutants include particulate matter, PM_{2.5},² (fine inhalable particles typical of early-life pollution) and ground-level ozone, created when pollutants react together.³ PM_{2.5} is the result of human activity, stemming from diesel use, agricultural dust, and industrial production. PM_{2.5} was attributable for upwards of 7.3 million asthma-related emergency room visits globally in 2020, while ground-level ozone was attributable for upwards of 8.5 million visits.⁴ This represents 3-7% of global emergency room visits for asthma annually.⁵

¹ Esposito, Stefano, Jacquelyne Germain, and Emmanuel Camarillo. "Chicago's Air Quality on Tuesday Was the World's Worst."

² City of Chicago. "Update on City of Chicago Response to Poor Air Quality Due to Smoke from Canadian Wildfires."

³ American Lung Association. "Most Polluted Cities: State of the Air."

⁴ Roberson. "Health Effects of Increase in Carbon Dioxide."

⁵ Kuylenstierna, Johan, Chris Malley, Patrick B ker, and Tangmar Marmon. "Air Pollution and Its Impact on Human Health: An Important Driver for Achieving the 1.5 C Goal of the Intergovernmental Panel on Climate Change."

In particular, children and infants bear the brunt of air pollution. Exposure to PM_{2.5} can increase the chance of premature birth by up to 18%. Additionally, exposure to air pollution increases the chances for children to experience low birth weight, severe asthma attacks, childhood pneumonia, heart attacks, and strokes⁶

Economic Impacts

The fiscal impact of air pollution is widespread, encapsulating factors from economic advancement to productivity. At the individual level, PM_{2.5} exposure is a strong predictor of upward mobility, economic opportunity, and race-based gaps in earnings.⁷ A reduction of 1 $\mu\text{g}/\text{m}^3$ (one-millionth of a gram per cubic meter of air) in prenatal PM_{2.5} exposure is associated with a \$1,105 increase in later-in-life yearly earnings and a 1.29 percentile increase in upward mobility.

Exposure to air pollution harms workers' productivity. In Europe, a 1 $\mu\text{g}/\text{m}^3$ increase in PM_{2.5} concentration caused a 0.8% reduction in real GDP that same year alone.⁸ Of that reduction, 95% stems from a decrease in worker output. Working in a cleaner professional environment facilitates higher productivity.⁹

Additionally, less air pollution leads to higher crop yields. Reducing nitrogen oxides, a widely emitted pollutant, by about half would improve yields by 25% for winter crops and 15% for summer crops in China. In the United States, reductions in air pollutants between 1999 and 2019 contributed to a 20% increase in corn and soybean yields, worth an estimated \$5 billion dollars during the period.¹⁰

This economic impact also extends to spending on health and wellness. Medical expenditures on respiratory ailments exceed \$75 billion annually in the US.¹¹ Between 2016 and 2018, the United States saw an additional \$89.4 billion dollars in health damages and nearly 10,000 deaths stemming from PM_{2.5} pollution.¹²

⁶ Ibid.

⁷ Colmer, Jonathan, John Voorheis, and Brennan Williams. "Air Pollution and Economic Opportunity in the United States."

⁸ Dechezleprêtre, Antoine, Nicholas Rivers, and Balazs Stadler. "The Economic Cost of Air Pollution: Evidence from Europe."

⁹ Neidell, Matthew, and Nico Pestel. "Air Pollution and Worker Productivity."

¹⁰ ScienceDaily. "Less Air Pollution Leads to Higher Crop Yields."

¹¹ Williams, Austin M., and Daniel J. Phaneuf. "The Morbidity Costs of Air Pollution: Evidence from Spending on Chronic Respiratory Conditions - Environmental and Resource Economics."

¹² Clay, Karen, and Nicholas Z. Muller. "Recent Increases in Air Pollution: Evidence and Implications for Mortality."

Racial Disparities and Environmental Justice

Marginalized communities, particularly low income populations, are disproportionately impacted by air pollution because factories, ports, and major roadways are often built in or near marginalized areas.⁷ For example, California's lowest-income households live in areas with significantly higher rates of PM_{2.5} pollution than high-income households. Households earning less than \$20,000 per year are exposed to 25% more PM_{2.5} pollution than those making over \$200,000 in a year.¹³ The City of Chicago is no different, particularly because of the strong correlation between socioeconomic status and racial identity that exists within the city. Below, Figure 1 illustrates the stark difference in PM_{2.5} exposure for individuals of varying socioeconomic status. Data shows that as the proportion of the population that is low income increases, average annual PM_{2.5} rates increase.

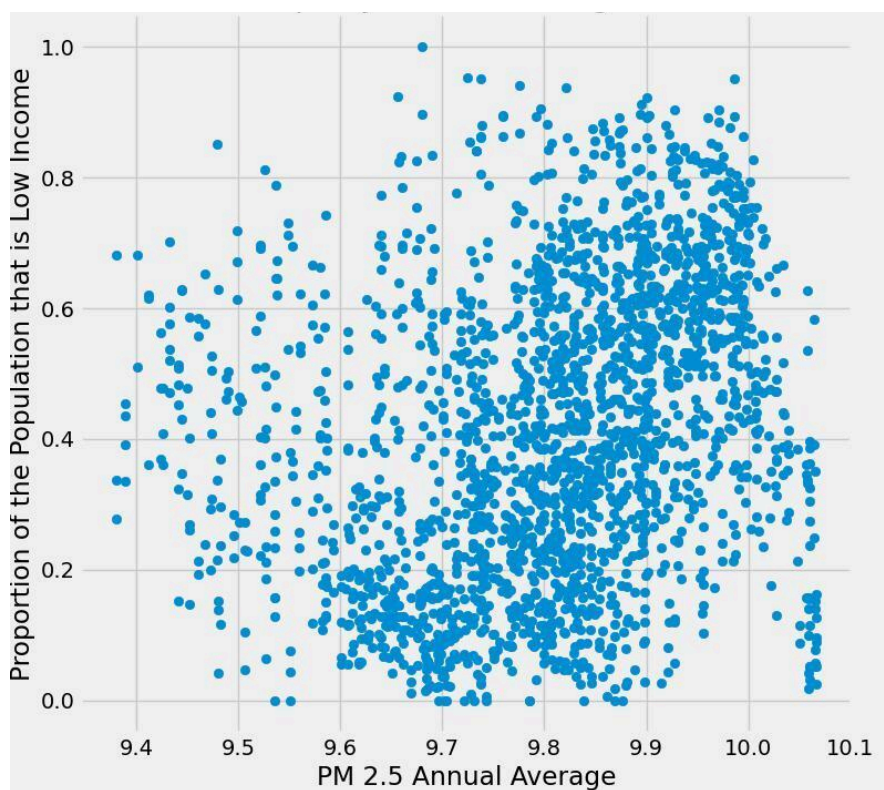


Figure 1: Rates of PM_{2.5} across Socioeconomic Groups in Chicago

Figure 2 highlights the unequal distribution of PM_{2.5} exposure along geographical lines. Regions of the city that are more wealthy and have a higher percentage of white residents experience lower rates of PM_{2.5} exposure while the poorer regions experience a greater level of exposure. Of particular note is the much cleaner northern suburbs and the much healthier south and west portions of the city.

¹³ Reichmuth, David. "Inequitable Exposure to Air Pollution from Vehicles in California."

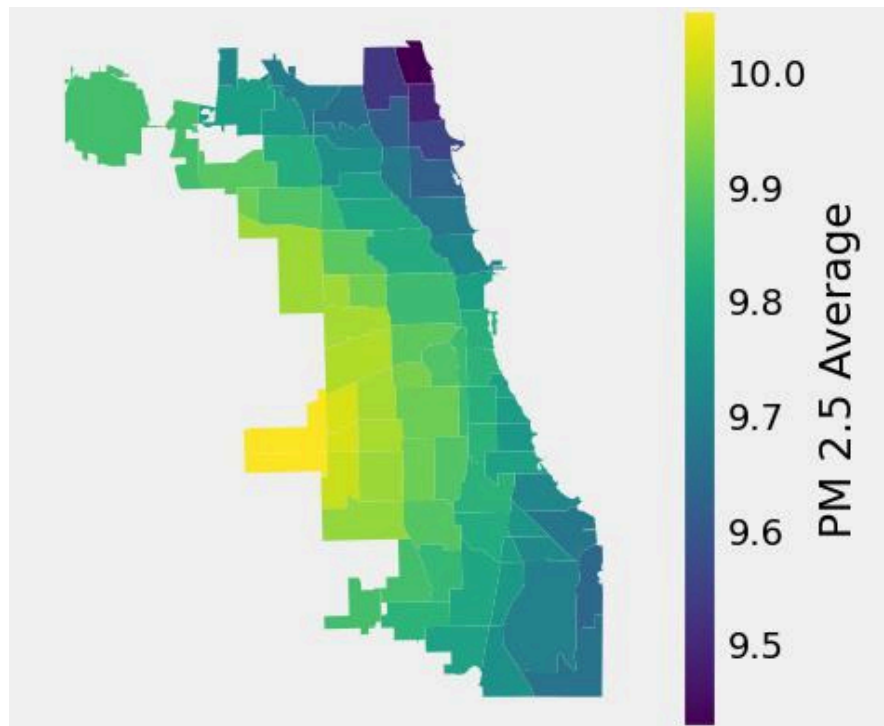


Figure 2: Presence of PM_{2.5} Pollution Across Chicago Neighborhoods

Causes of Air Pollution

The main drivers of air pollution are urbanization, economic growth, industrialization, and transportation. Humans are responsible for the majority of air pollution emissions. Some major pollutants include carbon monoxide, lead, ozone, nitrogen dioxide, particulate matter, and sulfur dioxide; each of these induces adverse health outcomes.¹⁵

The majority of pollutants are emitted via major sources (refineries, chemical and industrial industries, etc.) and mobile sources (vehicles). Among methods of transportation, cars are estimated to be responsible for 80% of today's pollution.¹⁶ Pollutants are also derived from indoor sources (domestic cleaning activities, gas stations, etc.) and natural sources (forest fires, volcanos, dust storms, etc.), though these are not as large of contributors.

Proximity to major and mobile sources of pollution is tied to the impact of air pollution felt by populations. The locality of O'Hare and Midway airports makes Chicagoans particularly vulnerable to nitrogen dioxide (NO₂), black carbon, and particulate matter from jet exhaust.¹⁷

Taxonomy of Pollutants

Particulate Matter

PM_{2.5} and PM₁₀, often referred to as particulate matter, are fine inhalable particles that are mixtures of solid particles and liquid droplets that form in the air. Particulate matter can refer to particles that are made up of hundreds of different chemicals and can range in size. These particles are nearly impossible to detect with the naked eye.¹⁴ A human hair is approximately 50 to 70 micrometers in diameter, while PM_{2.5} and PM₁₀ are less than 2.5 and 10 micrometers in diameter, respectively. Their small size can be deceiving. Particulate matter can have devastating effects on human health and well-being.

PM_{2.5} has proven to be particularly concerning. Exposure to PM_{2.5} is a strong predictor of upward mobility and economic opportunity. In Europe, a one-millionth of a gram per cubic meter of air increase in PM_{2.5} concentration caused a 0.8% reduction in real GDP that same year alone,¹⁵ while a reduction of the same amount in prenatal PM_{2.5} exposure is associated with a \$1,105 increase in later-in-life yearly earnings and a 1.29 percentile increase in upward mobility. PM_{2.5} was attributable for upwards of 7.3 million asthma-related emergency room visits globally in 2020 and increases the chance of premature birth by up to 18%.

Particulate matter is often the result of human activity, stemming from diesel use, agricultural dust, and industrial production, but can also originate from natural sources such as fires and dust storms. Particles can be emitted directly from a source, like a fire, or can be the result of complex reactions between different chemicals. Regardless of origin, particulate matter can pose a serious threat to human health.

¹⁴ EPA. "Particulate Matter (PM) Basics"

¹⁵Dechezleprêtre, Antoine, Nicholas Rivers, and Balazs Stadler. "The Economic Cost of Air Pollution: Evidence from Europe."

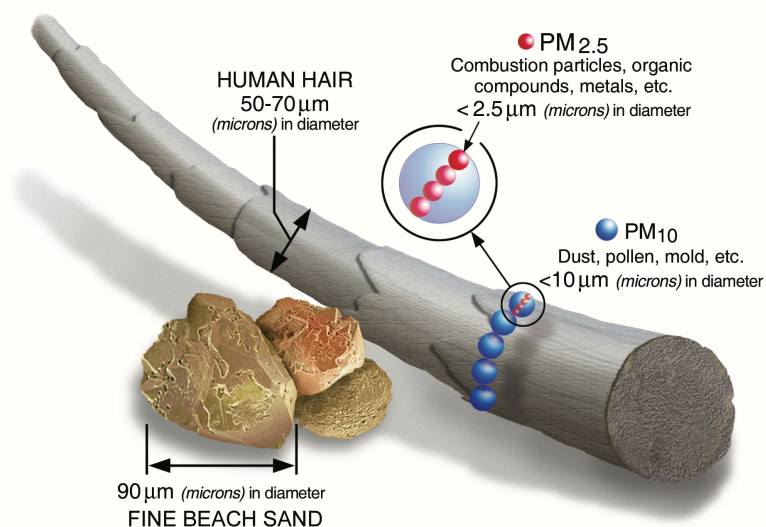


Figure 3: Size of Particulate Matter (Source: EPA)

Ozone

Ozone is a chemical compound composed of three oxygen atoms that has varied effects on the environment depending on its location in the atmosphere. Ozone in the stratosphere, a high level of the Earth's atmosphere, forms a protective layer that reduces exposure to damaging UV-B and UV-C ultraviolet rays. Human pollution, especially of a class of chemicals known as chlorofluorocarbons, has damaged the ozone layer, leading to a hole above Antarctica. Luckily, the 1989 Montreal Protocol regulated usage of chlorofluorocarbons and the hole in the ozone layer has shrunk since its implementation.

On the other hand, ozone in the troposphere, also known as ground-level ozone, can be harmful to human health. Unlike many other air pollutants, ground-level ozone is not emitted directly into the air, but is instead created by chemical reactions between nitrogen oxides (NO_x) and volatile organic compounds (VOC). The root pollutants that form tropospheric ozone have many sources, including cars, power plants, industrial boilers, refineries, and chemical plants.¹⁶

Since most of these sources are concentrated in urban areas, cities tend to bear the brunt of ground-level ozone pollution. However, ozone can travel long distances in areas with strong winds, so even rural areas are at risk of high ozone levels. Tropical areas face particularly high exposure to tropospheric ozone, especially during hot summer days. Exposure to ozone can lead to a wide variety of

¹⁶ US Environmental Protection Agency. "Ground-level Ozone Basics."

health issues. Beyond the expected respiratory consequences, it can also result in increased metabolic disorders, cancer, and increased mortality from cardiovascular diseases.¹⁷

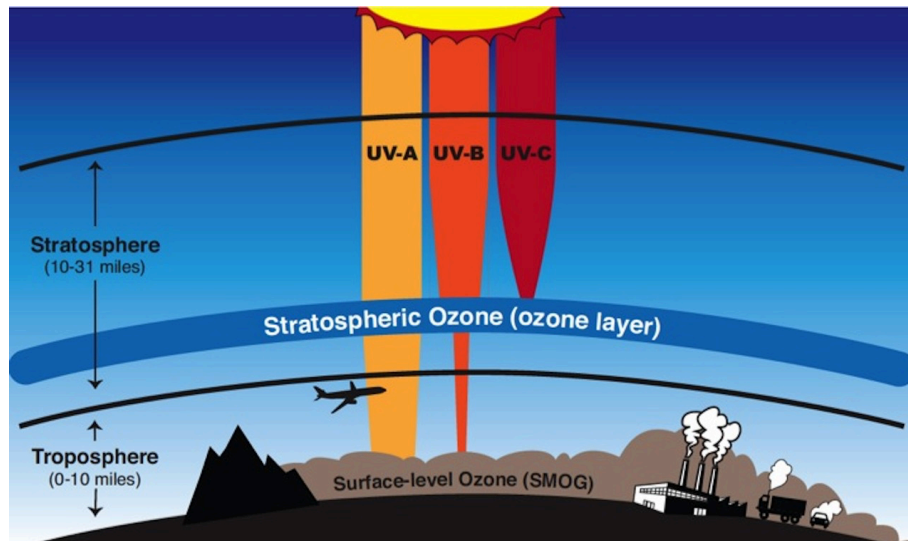


Figure 4: Ozone's Double-Edged Sword (image source NASA)

Nitrogen Oxides

Nitrogen oxides (NO_x) are a category of pollutants composed of nitrogen and oxygen produced from the combustion of fuel at high temperatures. The particles are harmful to the lungs, causing asthma, inflammation, and reduced lung function.¹⁸ Studies have found that NO_2 is also associated with decreased heart health, negative pregnancy and birth outcomes, and increased risk of kidney harm, autoimmune disease, and cancer.¹⁹ As discussed above, nitrogen oxides are one of the two essential ingredients for ground-level ozone formation, another harmful pollutant. Nitrogen oxides are generated from human sources such as fossil fuels and natural sources like wildfires. Cars, trucks, and buses contribute the most to human-generated nitrous oxide emissions. Industrial sources like diesel-powered equipment and coal-fired power plants are also sources of emissions.²⁰

Sulfur Dioxide

Sulfur dioxide (SO_2), the most common pollutant from the sulfur oxide group, is a gaseous pollutant with negative environmental and health impacts. Coal-fired power plants are the largest culprit of SO_2

¹⁷ American Lung Association. "Ozone."

¹⁸ U.S. Environmental Protection Agency. "Nitrogen Oxides Control Regulations."

¹⁹ American Lung Association. "Nitrogen Dioxide."

²⁰ EPA. "Nitrogen Oxides Control Regulations | Ground-Level Ozone."

emissions. Burning of other fossil fuels from combustion engines, boilers, and industrial processes also contributes to sulfur dioxide emissions. Once in the atmosphere, SO₂ can change its chemical composition into small sulfur particulate matter that can travel hundreds of miles.²¹ These sulfur particulates have the same negative effects as other particulate matter as discussed above. When SO₂ reacts with water in the atmosphere, it forms acid rain, which devastates aquatic ecosystems, removes nutrients from the soil, and damages human infrastructure.²² Sulfur dioxide gas also has negative consequences for lung health, especially for sensitive groups like children and people with asthma.²³

Carbon Monoxide

Carbon monoxide (CO) is a gas that decreases the amount of oxygen transported to the brain through the bloodstream. In high concentrations, carbon monoxide can cause dizziness, confusion, unconsciousness, or death. But these concentrations are only achieved indoors, from the burning of kerosene lamps, gas appliances, or running cars in enclosed spaces for example. The largest sources of outdoor CO pollution are cars, trucks, and other vehicles that burn fossil fuels. Outdoor carbon monoxide pollution still presents health risks for those with heart disease. Short-term exposure to elevated CO levels can cause a decrease in oxygen transported to the heart and chest pain.²⁴

Indoor Pollutants

Indoor air pollutants are also a serious threat to human health, if only because Americans spend 90% of their time indoors. Major sources of indoor air pollution include asbestos from building construction and furnishings, emissions from stoves and fires, mold, and radon. Unique to indoor air pollution is the importance of ventilation. Improving the circulation of air that moves from outdoors into a building is vital to reduce the concentration of indoor air pollutants. Filtration of air, usually as part of a building's central heating or cooling system, is also critical to remove pollutants from indoor air. Industry experts use the Minimum Efficiency Reporting Value, or MERV, to measure the ability of filters to capture pollutants. Most residential buildings use a one-inch 1-4 MERV fiberglass filter, but environmental agencies recommend using higher-rated filters. For instance, filters with a MERV rating of 13-16 can reduce indoor particles by as much as 95 percent.

²¹ American Lung Association. "Sulfur Dioxide."

²² EPA. "Effects of Acid Rain."

²³ EPA. "Sulfur Dioxide Basics."

²⁴ EPA. "Basic Information about Carbon Monoxide (CO) Outdoor Air Pollution."

Measuring Air Pollution: Air Quality Index (AQI)

The Air Quality Index (AQI) is used as a tool for reporting the daily air quality of a region.²⁵ By measuring the quantity of pollutants in the air, the AQI provides an index value that advises people of the safety of the air. Degrees of air quality include “Good,” “Moderate,” “Unhealthy for Sensitive Groups,” “Unhealthy,” “Very Unhealthy,” and “Hazardous.” The higher the value of the AQI, the more dangerous the air is to someone’s health, with values below 100 falling under the “Good” and “Moderate” categories and values above 100 considered unhealthy for most people. It’s important for people to remain aware of the AQI in the areas in which they frequent. Accurate and easily accessible AQI data ensures public safety.

Legislative Landscape

Clean Air Act

Like other states, the EPA has delegated enforcement of the Clean Air Act in Illinois through a State Implementation Plan (SIP). A state-level agency, the IEPA, administers the SIP which involves approving and enforcing permits for air pollution as well as setting state-level policies to facilitate bringing highly polluted areas into compliance. While the IEPA is the primary Clean Air Act regulator for Illinois, the EPA is in charge of setting the National Ambient Air Quality Standards (NAAQs) which dictate acceptable levels of pollution for the over 100 controlled pollutants. When a region’s air quality is below the NAAQ standard the IEPA is expected to mandate stricter air pollution permits for new facilities. Currently, Chicago is in compliance with the NAAQs for every controlled air pollutant, other than ozone, which means that new and existing facilities are bound only by minimal permit limits.²⁶ The designation of ozone is unclear and the process that follows a nonattainment is not being entirely followed.²⁷

Chicago’s Climate Action Plan

Chicago’s Climate Action Plan (CAP)¹⁸ includes electrifying personal and public transportation, encouraging biking, walking, and transit use, transitioning to citywide renewable energy by 2035, and planting 75,000 trees within the next five years. The CAP also includes plans to invest in air

²⁵American Lung Association. “Air Quality Index.”

²⁶US Environmental Protection Agency. “Nonattainment Areas for Criteria Pollutants (Green Book).”

²⁷Lattanzio, Richard. *Clean Air Act: A Summary of the Act and Its Major Requirements*.

monitoring across the city, which can be used to create more effective and equitable policies in the future. The emphasis on public transportation and reducing car dependency found in the CAP will keep pollutant-producing vehicles off the road, drastically reducing emissions throughout the neighborhoods in Chicago that border highways. All of this is on top of Illinois's move away from sources of toxic air pollution like coal and towards cleaner energy sources such as biofuels, solar, and wind energy.¹⁹ The CAP was born out of community demand for a commitment to sustainability, and it was written under Mayor Lori Lightfoot. A variety of environmental groups and analysts contributed to this document, and it caters to the desires of many special interest groups.²⁸ Its main goal is to reduce carbon footprint within Chicago, which would be a desirable outcome, and the plan specifies that this would create co-benefits that extend from air pollution reduction to more equitable access to transit. Nevertheless, the CAP is an extension of current shallow environmental advocacy, creating changes within the current structure of economic growth. More emphasis is placed on increasing energy consumption and electric vehicle use instead of creating tighter communities with less need for vehicle transportation. For a long-term, ambitious plan of this nature, the opportunity existed for the city to put the environment and the people of Chicago first. Aside from the co-benefits that the action plan relies on, very few of the changes would directly improve the lives of Chicagoans. The Climate Action Plan offered Chicago the chance to reimagine what it values by addressing past mistakes. Instead, the plan focuses on what Chicago can do moving forward within the dominant structure of economic progress.

The benefit of creating a plan with less ambitious recommendations is that it should be easier to achieve. The Chicago Climate Action Plan is incredibly detailed, and it doesn't rely on original innovations. With the right funding and expertise, its goals should be met. Nevertheless, there is no political or legal binding in the Chicago Climate Action Plan.²⁹ With the end of Mayor Lightfoot's term, there is no obligation for future mayors to utilize the Climate Action Plan. Until October of 2023, there was not a Department of Environment to orchestrate all the actions the plan calls for. In its current form, the Chicago Climate Action Plan is a set of goals that, if achieved, will accelerate the transformation of Chicago into a leader in sustainability. Unfortunately, these goals are not attributed to anyone in particular, limiting accountability and responsibility.

²⁸ Illinois Environmental Council. "A Closer Look at Chicago's Climate Action Plan."

²⁹ City of Chicago. "2022 Chicago Climate Action Plan."

Air Quality Ordinance

In 2021, the City of Chicago approved an air quality ordinance designed to help prevent the expansion of new air pollutants. While the Chicago Climate Action Plan outlines long-term structural changes, the Air Quality Ordinance contains binding policy that is actively being used. The Air Quality Ordinance (AQO) requires city review of zoning for possible sources of air pollution, including a traffic study and an air quality impact study. The ordinance requires sites to be approved by the Department of Planning and Development, the Department of Public Health, the Department of Transportation, the Chicago Plan Commission, the City Council Committee on Zoning, Landmarks and Building Standards, and the full City Council. These regulations apply to recycling facilities, storage warehousing, freight terminals, coal uses, and manganese-bearing uses. Special considerations will be made when these uses are near residential zoning.³⁰

This policy directly addresses the major sources of air pollution identified earlier in this report, and the considerations given to traffic flow as well as industrial uses near residential areas will help to reduce the environmental injustice in Chicago. As a recent Northwestern study showed, air pollution in Chicago is concentrated in the southwest portion of the city, caused by the highways and industrialized areas that cut through the west side of the city.³¹ For these reasons, the AQO represents the first step to achieving the reduced air pollution and environmental justice that Chicago has determined are co-benefits of the Climate Action Plan. There are areas of weakness in the AQO. Firstly, the AQO by design requires communication between a variety of city-wide organizations. This brings into question the feasibility of the AQO, as it may take long periods of time for each group to verify and approve the development plans. The current structure of the AQO must also be altered to allow for the input of the new Department of the Environment. The AQO also limits itself to new construction or expansion. How will the city address factories and warehouses that are already in place? Will there be a retroactive review, or are those plants grandfathered in even if they do have approval by the various departments? Overall, the AQO is the first of many necessary regulations the city must create to reduce air pollution.

Policy Solutions

To build upon Chicago's current policies, policymakers must craft policies that are cost-effective while also considering the spillover effect. By weighing the spillover effect, governments can rule out

³⁰ City of Chicago. "Chicago Air Quality Ordinance."

³¹ Morris, Amanda. "Chicago's West Side Is An Air Pollution Hotspot."

temporary fixes such as moving major sources of pollutants outside of the city. Policies must also address the reality that Chicago is both a major shipping hub and a highly populated city.

While reducing exposure to air pollution does prevent some adverse effects, fighting the root cause—emissions—is the strongest way to protect populations.²⁰ One preventative treatment to mitigate the negative effects caused by air pollution is to reduce the amount of carbon in the air. This strategy includes reducing deforestation, creating green areas, and transitioning to sustainable production processes. Another is taxing carbon and pollutant emissions and encouraging sustainable and mixed-use development, which would improve air quality. Many of these recommendations are found within the CAP³², but without anything binding, it is unlikely that the necessary changes will be made. Even if the CAP or a similar document were to receive legal or political backing, the newly reformed Department of the Environment does not have the resources to carry out sweeping infrastructure and policy changes: Currently, there are 11 employees in the Department, with one person in charge of all permitting and enforcement for all of Chicago³³. To reduce the air pollution in Chicago, the city will have to put more resources into its Department of the Environment. Bringing the department back was a necessary move as citations for air pollution had dropped 90% since the public health department had taken over enforcement³⁴, but the department does not have the power it needs. The head of the department, Angelo Tovar, admitted that “department officials would have no authority to enforce environmental laws”.³⁵ For Chicago to reach its air pollution goals and deliver breathable air to all members of its city, it must expand the Department of the Environment.

³² City of Chicago. “2022 Chicago Climate Action Plan.”

³³ City of Chicago. “Department of the Environment Organizational Chart.”

³⁴ Evans, Maxwell. “Alderpeople Ask, ‘Where’s The Beef’ On Revived Department Of Environment?”

³⁵ Ibid.

Clean Air Act Designation



Figure 5: Air pollution from Chicago blowing across the Wisconsin-Illinois border (Source: NASA)

The status of Chicago's attainment for ozone pollution under the Clean Air Act is complicated. The Clean Air Act is a federal regulation enforced by the Environmental Protection Agency (EPA) that establishes the limits of air pollution in a variety of categories.³⁶ Historically, Chicago, contained in Cook County, has been designated as in attainment for air pollution, up to 2015.³⁷ Counties in Illinois and Wisconsin to the north of Cook County were designated as nonattainment. The EPA is empowered to reevaluate the designation of regions anywhere in the country as nonattainment for any pollutants for which pollution exceeds the National Ambient Air Quality Standards (NAAQs). While Chicago complies with the NAAQs, there have been instances where the EPA has made the decision to redesignate a region as nonattainment for a NAAQ standard if it is determined that its air pollution is leaving the region and causing an adjacent region to be unable to meet the NAAQs. In 2015, the EPA published a report evaluating the state of ozone pollution across Illinois.³⁸ That report concluded that while Chicago is in attainment for ozone, nearby Kenosha County was not in attainment due to

³⁶ Lattanzio, Richard. *Clean Air Act: A Summary of the Act and Its Major Requirements*.

³⁷ EPA. "Chicago, IL-IN-WI Nonattainment Area Final Area Designations for the 2015 Ozone National Ambient Air Quality Standards."

³⁸ Ibid.

pollution blowing into the county from Chicago. In light of that finding, the EPA recommended that Chicago be redesignated as nonattainment for ozone.³⁹ It appears that this recommendation was fulfilled, as the EPA listed Cook County, as well as nearby counties in both Wisconsin and Illinois, as nonattainment for ozone.⁴⁰ However, in 2022, the EPA proposed redesignating the Chicago MSA as in attainment for ozone which was ultimately approved.⁴¹ The EPA's internal coordination on this issue appears to be poor. In 2022, Chicago was also included on a list of cities to be designated as seriously out of attainment by the EPA, but this proposal was dropped due to the slightly earlier 2022 redesignation as in attainment.⁴² The proposal mentions that the nonattainment status was upgraded from moderate to serious in 2019 while proposing a ruling to downgrade the designation to in attainment.⁴³ This would drastically alter the restrictions on new pollutant sources and the measurement of old pollutant sources. Because the EPA's green book lists Cook County as currently in nonattainment, it appears this proposal has not succeeded, however, the repeated designation and redesignation of Chicago's ozone pollution attainment has hampered efforts to apply the restrictions in the Clean Air Act to Chicago. The designation listed by the EPA currently is moderately nonattainment, which requires a commitment to 15% VOC reduction and imposing reasonably available control technology on all major pollutants, as well as private transportation regulation.⁴⁴ If this is Chicago's actual designation, the city does not appear to be meeting these guidelines: the Clean Air Ordinance, which serves as Chicago's major air pollution prevention policy, only regulates construction and expansion, not improvements on existing pollutant sources⁴⁵. To reduce the air pollution in Chicago, we recommend definitively establishing Cook County as at least moderately nonattainment for ozone. A nonattainment designation has a cascading impact on the regulation regime for Chicago and Illinois more broadly. Were the EPA to designate Cook County as nonattainment for ozone, the State Implementation Plan for Illinois would have to be updated to require stricter air permits for new facilities, which would be a huge boon to air quality across the city.

Finally, Chicago should join the C40 Clean Air Accelerator: Chicago has already joined the C40 city climate coalition but has declined to sign on to the clean air pledges created under the C40 Clean Air Accelerator program.

³⁹ Ibid.

⁴⁰ EPA. "8-Hour Ozone (2015) Designated Area State/Area/County Report."

⁴¹ The Federal Register: The Daily Journal of the United States Government. "Air Plan Approval; Illinois; Redesignation."

⁴² The Federal Register: The Daily Journal of the United States Government. "Determinations of Attainment by the Attainment Date, Extensions of the Attainment Date, and Reclassification of Areas Classified as Serious for the 2008 Ozone National Ambient Air Quality Standards."

⁴³ Ibid.

⁴⁴ Lattanzio, Richard. *Clean Air Act: A Summary of the Act and Its Major Requirements*.

⁴⁵ City of Chicago. "Chicago Air Quality Ordinance."

References

Esposito, Stefano, Jacquelyne Germain, and Emmanuel Camarillo. "Chicago's Air Quality on Tuesday Was the World's Worst." *Times*, June 27, 2023.

<https://chicago.suntimes.com/2023/6/27/23775335/chicago-air-quality-canadian-wildfires-worlds-worst>.

"Update on City of Chicago Response to Poor Air Quality Due to Smoke from Canadian Wildfires." City of Chicago :: Update on City Of Chicago Response To Poor Air Quality Due To Smoke From Canadian Wildfires. Accessed May 15, 2024.

https://www.chicago.gov/city/en/depts/mayor/press_room/press_releases/2023/june/UpdateOnChicagoResponseToPoorAirQuality.html.

"Most Polluted Cities: State of the Air." State of the Air | American Lung Association. Accessed May 15, 2024. <https://www.lung.org/research/sota/city-rankings/most-polluted-cities>.

Roberson. "Health Effects of Increase in Carbon Dioxide."

Kuylenstierna, Johan, Chris Malley, Patrick Bükér, and Tangmar Marmon. "Air Pollution and Its Impact on Human Health: An Important Driver for Achieving the 1.5°C Goal of the Intergovernmental Panel on Climate Change."

Colmer, Jonathan, John Voorheis, and Brennan Williams. "Air Pollution and Economic Opportunity in the United States." *Colorado.edu*. Accessed November 26, 2023.

www.colorado.edu/economics/sites/default/files/attached-files/colmer.pdf.

Dechezleprêtre, Antoine, Nicholas Rivers, and Balazs Stadler. "The Economic Cost of Air Pollution: Evidence from Europe." *one.oecd.org*, August 26, 2020.

[one.oecd.org/document/ECO/WKP\(2019\)54/En/pdf](http://one.oecd.org/document/ECO/WKP(2019)54/En/pdf).

Neidell, Matthew, and Nico Pestel. "Air Pollution and Worker Productivity." *IZA World of Labor*, February 15, 2023.

"Less Air Pollution Leads to Higher Crop Yields." *ScienceDaily*, June 1, 2022.

www.sciencedaily.com/releases/2022/06/220601142841.html.

Williams, Austin M., and Daniel J. Phaneuf. "The Morbidity Costs of Air Pollution: Evidence from Spending on Chronic Respiratory Conditions - Environmental and Resource

Economics." SpringerLink, March 28, 2019.

<https://link.springer.com/article/10.1007/s10640-019-00336-9>.

Clay, Karen, Nicholas Z. Muller, and Xiao Wang. "Recent Increases in Air Pollution: Evidence and Implications for Mortality." *Review of Environmental Economics and Policy* 15, no. 1 (January 1, 2021): 154–62. <https://doi.org/10.1086/712983>.

Reichmuth, David. "Inequitable Exposure to Air Pollution from Vehicles in California." [ucsusa.org](https://www.ucsusa.org/sites/default/files/attach/2019/02/cv-air-pollution-CA-web.pdf), February 2019. [ucsusa.org/sites/default/files/attach/2019/02/cv-air-pollution-CA-web.pdf](https://www.ucsusa.org/sites/default/files/attach/2019/02/cv-air-pollution-CA-web.pdf).

"Particulate Matter Basics." US Environmental Protection Agency, Accessed April 24, 2024.

<https://www.epa.gov/pm-pollution/particulate-matter-pm-basics>.

Dechezleprêtre, Antoine, Nicholas Rivers, and Balazs Stadler. "The Economic Cost of Air Pollution: Evidence from Europe." OECD. August 26, 2020.

[one.oecd.org/document/ECO/WKP\(2019\)54/En/pdf](https://one.oecd.org/document/ECO/WKP(2019)54/En/pdf).

"Ground-level Ozone Basics." US Environmental Protection Agency, June 2, 2023.

<https://www.epa.gov/ground-level-ozone-pollution/ground-level-ozone-basics>.

"Ozone." American Lung Association, April 7, 2024.

<https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/ozone>

"Nitrogen Oxides Control Regulations." U.S. Environmental Protection Agency. Accessed May 9, 2024.

<https://www3.epa.gov/region1/airquality/nnox.html#:~:text=Nitrogen%20Oxides%20are%20a%20family,equipment,%20boats,%20etc>.

"Nitrogen Dioxide." American Lung Association, October 26, 2023.

<https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/nitrogen-dioxide>.

"Sulfur Dioxide." American Lung Association, October 26, 2023.

<https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/sulfur-dioxide>

"Effects of Acid Rain." US Environmental Protection Agency. Accessed May 15, 2024.

<https://www.epa.gov/acidrain/effects-acid-rain>

"Sulfur Dioxide Basics." US Environmental Protection Agency. Accessed May 15, 2024.

<https://www.epa.gov/so2-pollution/sulfur-dioxide-basics>

- “Basic Information About Carbon Monoxide.” US Environmental Protection Agency. Accessed May 15, 2024.
<https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution>
- “Nonattainment Areas for Criteria Pollutants (Green Book).” US Environmental Protection Agency. Accessed May 9, 2024. <https://www.epa.gov/green-book>.
- Lattanzio, Richard. Clean Air Act: A Summary of the Act and Its Major Requirements. Congressional Research Service, September 2022.
<https://crsreports.congress.gov/product/pdf/RL/RL30853>.
- “A Closer Look at Chicago’s Climate Action Plan.” Illinois Environmental Council, 20 June 2022,
<https://ilenviro.org/a-closer-look-at-chicagos-climate-action-plan/>.
- “2022 Chicago Climate Action Plan.” n.d.
<http://www.chicago.gov/content/dam/city/sites/climate-action-plan/documents/Chicago-CA-P-071822.pdf>.
- “Chicago Air Quality Ordinance.” City of Chicago. March 2021.
https://www.chicago.gov/content/city/en/depts/dcd/supp_info/chicago-air-quality-ordinance.html.
- Morris, Amanda. “Chicago’s West Side Is Air Pollution Hotspot.” Northwestern Now. September 21, 2023.
<https://news.northwestern.edu/stories/2023/09/chicagos-west-side-is-air-pollution-hotspot/>.
- “Department of the Environment Organizational Chart.” City of Chicago,
<https://www.chicago.gov/content/dam/city/depts/doe/general/DOEorganizationchart.pdf>.
- Evans, Maxwell. “Alderpeople Ask, ‘Where’s The Beef’ On Revived Department Of Environment?” Block Club Chicago, Oct. 27 2023,
<http://blockclubchicago.org/2023/10/27/revived-department-of-environment-no-enforcement-power-brandon-johnson/>.
- “Chicago, IL-IN-WI Nonattainment Area Final Area Designations for the 2015 Ozone National Ambient Air Quality Standards.” US Environmental Protection Agency. May 2021.
https://www.epa.gov/sites/default/files/2021-05/documents/il_in_wi_chicago_tsd_remand_final.pdf.

“8-Hour Ozone (2015) Designated Area State/Area/County Report | Green Book.” US Environmental Protection Agency, April 30, 2024.
<https://www3.epa.gov/airquality/greenbook/jbcs.html#IL>.

“Air Plan Approval; Illinois; Redesignation.” The Federal Register: The Daily Journal of the United States Government. October 3, 2024. <https://unblock.federalregister.gov/>.

“Determinations of Attainment by the Attainment Date, Extensions of the Attainment Date, and Reclassification of Areas Classified as Serious for the 2008 Ozone National Ambient Air Quality Standards.” The Federal Register: The Daily Journal of the United States Government. 2022.
<https://www.federalregister.gov/documents/2022/10/07/2022-20458/determinations-of-attainment-by-the-attainment-date-extensions-of-the-attainment-date-and>

Cover Photo: Communities Should Champion Green Energy (USC Bedrosian)

Authors: Noah Crutchfield, Ethan Jiang, Sanju Patel, Jack McDonald, Yvona Nikitin, Sadie Foer, Sammy Thiagarajan, Jen Spinoglio

Environmental Research Group

University of Chicago

[Enviroresearchgroup.github.io/erg/](https://enviroresearchgroup.github.io/erg/)