

# FOR GOOD JOBS & CLEAN AIR

## HOW A JUST TRANSITION TO ZERO EMISSION VEHICLES CAN TRANSFORM WAREHOUSING

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# INTRODUCTION

In the era of same-day delivery, it is easy to forget that most of the objects we use every day are made of materials extracted and assembled overseas, shipped to a US coastal port, hauled by a trucker to a distribution center, and transported to a warehouse. Inside the warehouse, it will pass through the hands of many packers, pickers, and delivery drivers to find its way to either a store shelf or your front door. The shipping containers, port vehicles, drayage, and long-haul trucks that move our goods run on fossil fuels, like diesel, that pump our air full of fumes that are toxic to public health and the environment. Fossil fuels that power our supply chain are the driving force of the climate crisis, filling the atmosphere with greenhouse gasses, disrupting natural systems, exposing people to sickness and leading them to premature death.

In this report, we zoom in on Will County, Illinois, home to North America's largest inland port, CenterPoint Logistics Park. CenterPoint makes Will County one of the most important logistics hubs in the country, drawing some of the richest companies in the world to the region to set up their warehouse, distribution, and fulfillment centers. Those companies are the culprit of heavy emissions, causing some of the worst air pollution in Cook, Kendall, Kane, DuPage, DeKalb, Lake, McHenry, Kankakee, Grundy, and Will County.<sup>1</sup> The data in this report was collected by Warehouse Workers for Justice (WWJ) organizers, leaders, and

volunteers in Joliet and Elwood, Will County, to highlight the toxic impacts the local industry has on workers and residents.

Throughout this report, we share stories of truck drivers, warehouse workers, and those who call Will County home who recount their lived experiences with poor air quality and bad jobs in the warehouses. We find that the same opaque business models which allow the richest corporations in the world to treat their workers like they are expendable are the same structures



that allow billionaire companies to skirt environmental regulations. Angela Ortiz, former Amazon worker and current leader with WWJ, describes how labor and environmental abuses are tied in Joliet, Illinois: “In exchange for jobs, low-paying jobs at that, our land, air, and water are polluted.”<sup>2</sup> We show how working-class, immigrant, and Black and Brown communities experience both labor and environmental issues because of their relationship with the warehouse industry. In people’s lived experiences, environmental and labor justice issues caused by the warehouse and distribution industries are inextricably linked and must be addressed as one.

To slash emissions of Illinois’ transportation sector and mitigate future diesel-related public health harms, the state must transition to 100% zero emission, electric vehicle (EV) fleets. Clean air and good jobs solutions are the most appropriate way to respond to the harms felt most by directly affected communities, and the taxpayer-funded transition to EVs in the private warehousing and logistics industries provides the perfect moment to design new and groundbreaking policy solutions. To create an equitable and just transition to EVs, companies should be required to improve workplace standards for supply chain workers to gain access to state or federal EV transition funding. Eric, an Amazon warehouse worker in Will County, explains this two-part investment well: “during such a time of crucial technological change, the best way for such a profitable business to invest in green technology and therefore our future is to invest in its workers; giving them the resources needed to adapt and not only survive in a greener,

more electric world but also to thrive. Promoting various training programs from within the company is important.”<sup>3</sup>

In 2021, new state and federal-level investments made zero-emission transportation technology a possibility and a priority for the country, but we need further and more radical policy action that will address the underlying conditions that brought us to this state of climate crisis. Companies at the top of the supply chain are currently some of the state’s biggest polluters, generating billions of dollars in revenue through exploitative work models that drain communities of essential resources like breathable air and cheat workers out of good jobs. Fortune 500 companies like Walmart, who made \$555.23 billion,<sup>4</sup> and Amazon, who made \$469.82 billion total net sales revenue in 2021,<sup>5</sup> saw record profits during the COVID-19 pandemic at the expense of warehouse workers’ health. These billion-dollar corporations have the money to improve quality of life for residents and workers experiencing the negative health effects of diesel pollution by providing family-sustaining, dignified jobs and clean air.

# BACKGROUND

Warehouse Workers for Justice is a nonprofit workers' center that educates supply chain workers about their rights and supports worker organizing to advocate for good jobs with dignity across Chicago and Will County, IL, a major warehousing and distribution hub for the United States. Home to some of the largest companies in the world, vital warehouses in the area include Amazon, Target, Home Depot, Walmart, Mars, IKEA, and many more. Annually, nearly 4%, or \$735 billion of the country's Gross Domestic Product (GDP) moves through the area's port and surrounding warehouses, rails, highways, and rivers of the county.<sup>6</sup> Corporations profit from access to an immense network of warehouses, intermodals, and freight yards that characterize Will County's landscapes. Yet, despite their reliance on the area's centrality, resources, and workforce, these industries offer little in return to communities living in this vital region in the global supply chain. Logistics companies operate through business models that exploit their increasingly temporary, primarily immigrant workers and workers of color, ignoring that these workers are the backbone of their profit-generating businesses. While many companies have had record sales numbers during the COVID-19 pandemic, workers have not seen a fair share of these profits as demands on the e-commerce industry have skyrocketed and placed additional burdens on workers during the pandemic.

Not only does the warehousing industry exploit workers, but it exploits the environment as well. Because the industry is heavily reliant on ground transportation, it draws tens of thousands of diesel-fueled trucks to Will County every day, degrading the air quality and health of residents. Will County is in the 98th percentile of diesel-related negative health impacts in the nation,<sup>7</sup> experiencing worse air and subsequent health complications than most other counties across the country. Transportation is the largest single contributor to greenhouse gas emissions in the U.S., and the goods movement industry majorly contributes to that sector. Heavy-duty trucks that haul freight along highways and truck routes make up the largest share of transportation's cancer-causing pollution, a sector culpable for 58% of all diesel emissions in the country.<sup>8</sup> According to conversations with community members, it seems that many children in the community are born with, develop, or experience symptoms of asthma early on. An uninvestigated rise in lung conditions coincides with a massive boom in warehousing in the region, where working-class communities see more warehouses crop up than ever before. This report investigates the implications of the warehouse industry's exponential growth to argue that an equitable electrification policy can and should address both environmental and worker injustices.

# ENVIRONMENTAL RACISM & PUBLIC HEALTH

The COVID-19 pandemic has both exposed and worsened the inequalities that have historically harmed working people and their families. Warehouses and factories were some of the hardest hit sectors during the height of the pandemic in Illinois.<sup>9</sup> Warehouse workers who do not have the luxury of working from home have consistently clocked into work through the highs and lows of the pandemic, proving their essential role in the supply chain, and the disregard that profit-hungry company executives and politicians have for workers' safety. During a pandemic that targets the respiratory system, safe working conditions and employer-sponsored health care should be prioritized to keep the public safe. Toxic diesel soot jeopardizes the respiratory system, heightening one's risk of suffering from COVID-related symptoms, and creates unhealthy workplaces and neighborhoods.

Diesel pollution, or lung-damaging soot, is composed of nearly 40 toxic chemicals, which we can breathe so deeply into our lungs that it can reach the base of our bronchial tubes, inflaming and damaging blood vessels which can lead to long-term lung, heart, and brain complications.<sup>10</sup> In cases of long-term exposure, lung-damaging soot can cause allergies, high blood pressure, blood clots, Chronic Obstructive Pulmonary Disease (COPD), asthma, stroke, heart attack and pregnancy complications.<sup>11</sup>

Those who work, live, and play close to diesel-laden truck routes and industrial hubs face cumulative, and currently under-measured, health risks from diesel soot. The Clean Air Task Force estimates that diesel pollution is responsible for over 8,800 deaths, 3,700 heart attacks, hundreds of thousands of respiratory illnesses, and up to one trillion dollars in yearly health damages,<sup>12</sup> a healthcare cost unfairly placed on workers and their families. Communities of color across the Chicagoland metro area face the growing threat of diesel soot as more and more warehouses crop up to meet increasing COVID-19-era e-commerce demands.

Because warehouse workers are overwhelmingly from immigrant communities and communities of color, they are statistically more likely to live in neighborhoods experiencing heavy truck traffic and resultant air quality burdens from diesel soot. Using publicly available information, the Environmental Defense Fund (EDF) layered Will County warehouse locations and health data to visualize the relationship between inequities and proximity to warehouses (see appendix A for a sample proximity map). Among other disparities, EDF's analysis found that Will County residents within half a mile of an identified warehouse have higher asthma prevalence compared to the county's asthma average.

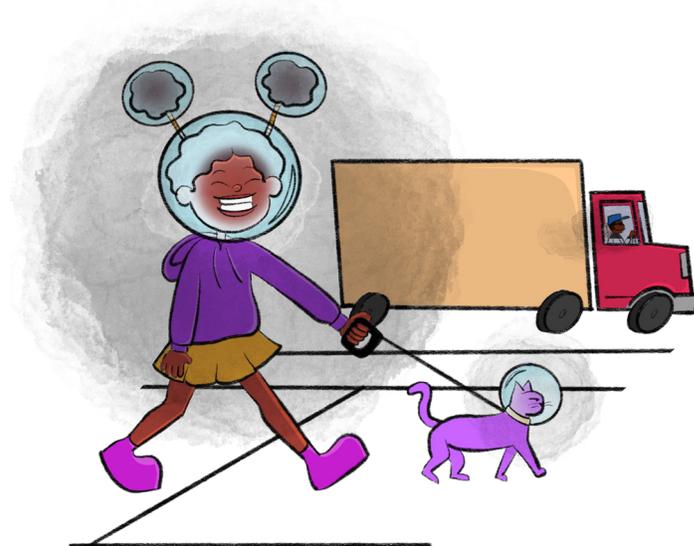
County-specific data about projected negative health outcomes from diesel

also highlights the urgency of addressing the public health crisis caused by diesel soot in Will County communities. Adverse public health outcomes and high monetary costs are expected if diesel pollution is not adequately addressed in Will County. The Clean Air Task Force “Deaths by Dirty Diesel” study from January of 2022 predicts over 500 cases of respiratory symptoms, 24 deaths, and \$268,550,872 in monetized health damages from diesel soot in Will County in 2023 alone (see appendix B for diesel-related health outcomes for Will County in 2023). Clean air investments cannot wait, and must be prioritized in directly impacted, working-class communities hit first and worst by diesel-related pollution and related negative health outcomes.

The unsafe levels of diesel soot in Will County’s working-class communities of color are characteristic of widespread patterns of environmental racism nationwide. Legacies of racialized and discriminatory land use policies have led to highly segregated communities and rendered property cheapest where Black, Brown and immigrant communities currently live.<sup>13</sup> Where one lives dictates access to publicly available resources and overwhelmingly impacts one’s quality of life. Therefore, it is important to steer policy making towards issues in geographic places that have been systematically abandoned by public agencies and elected officials who create infrastructure planning that ensures access to environmental public goods like breathable air, potable water, and open, green spaces. Across the fifty states, studies show that communities of color face higher levels of pollution from dirty industries than white communities.<sup>14</sup> In addition, studies that measure national

diesel pollution exposure by racial-ethnic identity find that the major emission source sectors like light to heavy-duty vehicles pose dangerous threats to the health of Black, Asian, Latine, and other immigrant and low-income populations. In fact, emissions in communities of color account for about 75% of total diesel personal exposure in the country.<sup>15</sup>

Burdensome exposure to toxic chemicals leads to unequal health outcomes. According to national studies measuring asthma disparities, Black people in the U.S. are three times more likely to die from asthma than white people.<sup>16</sup> Not only are people of color living closest to sites of diesel and other kinds of pollution, but working-class communities and communities of color are often employed in polluting industries. In Illinois, Black and Latine workers account for 85% of temporary workers in factories and warehouses despite the state’s overall workforce being only 35% non-white.<sup>17</sup> Labor that relies predominantly on Black and Brown workers to move, pack, and ship goods in such constant and close quarters to diesel trucks makes warehouses toxic sites for



workers of color. The cumulative impacts of toxic emissions make workers of color especially vulnerable to lung disease. Packers, pickers, and other workers on the shop floor are on their feet all shift as trucks pull up to the warehouse to unload shipments or load delivery trucks. Because physical exertion leads to more frequent and deeper inhalation of diesel soot, warehouse workers are likely to breathe the deadly smoke deep into their lungs, and even bloodstream, over long periods of time.<sup>18</sup>

While working-class residents are more likely to experience unhealthy levels of diesel soot on the job and at home, they are also less likely to have access to appropriate healthcare to deal with resultant health concerns. In a WWJ survey about working conditions in the warehouses during the height of the pandemic, 49% of interviewed warehouse workers said they did not have health insurance at all.<sup>19</sup> Warehouse workers work near each other as they pack or pick on the line, making social distancing hard to maintain and promoting the spread of COVID. Surveyed workers also reported that their employers did the bare minimum to keep workers safe. Withholding information about outbreaks at work, refusing workers their sick or hazard pay, and retaliation against workers who spoke out about unsafe COVID protocols are some of the life-threatening actions of employers who prioritize profit over worker health and safety.<sup>20</sup> Considering additional health risks that diesel pollution poses on top of existing COVID threats, air quality is an important, though often unnamed, factor in health and safety concerns at the workplace. Additionally, diesel-affected workers often navigate

necessary healthcare without lifesaving insurance, forcing them to bear the cost of treatment out of pocket. Notably, immigration and documentation status are also likely factors in environmental racism and related health and job concerns. Immigrant communities are more likely to live close to sites of toxic pollution and to live in areas where land, water and air are contaminated.<sup>21</sup> At the same time, immigrant workers make up a large percentage of workers on the warehouse shop floor, and oftentimes their immigration status increases vulnerability to exploitative conditions on the job that are compounded with environmental degradation in the community. Because of an increasingly racialized, militarized and punitive immigration system and a lack of enforceable worker protections, employers often use the threat of deportation as a tool of exploitation in warehouses. Undocumented workers receive threats from management who use unjust immigration law to threaten workers or scare them out of enforcing their rights, including their right to a healthy and safe workplace. In this way, citizenship status and race are used to divide the workers and ultimately create unsafe workplace conditions. It is difficult to take legally protected labor actions for temporary workers, but especially for migrant workers without documentation. In work that rarely provides protections, such as adequate or affordable health care plans, the cumulative impacts of polluted communities and unhealthy jobs particularly harm immigrant workers.

# METHODOLOGY

Diesel pollution comes from tailpipes and mixes with other solid and liquid micro-particles in smoke, dust, and other substances to form tiny “particulate matter” that is just 2.5 micrometers or less (PM2.5), producing an airborne lung-damaging soot.<sup>22</sup> Fine soot contains particulates just 3% the diameter of a single human hair. Lung-damaging PM2.5 warrants great concern because toxins of that size can enter our sinuses, lungs, and bloodstream.<sup>23</sup> In this study, we used two types of commercially available air monitors, Purple Air and AirBeam sensors, to capture spikes of diesel soot by collecting information about PM2.5 pollution levels in real time.

To take air quality readings, data was collected through mobile and stationary means, each process using a different brand of monitor. Purple Air PA-II-SD stationary monitors collected round-the-clock data at four set locations. Habitat Map AirBeam portable monitors were used to collect information on personal exposure at the time of mobile use. We selected these two monitors based on utility and affordability. Both monitors provide readings on PM2.5, which allows us to capture diesel soot. Both monitors are also low-cost sensor options that allowed our community-based organization to purchase multiple devices which we could then make available to the broader community.

The Purple Air monitors ran continuously for eight weeks from

6/16/21-8/22/21. We chose these monitors for their efficiency at collecting stationary readings, meaning they collected the data in a fixed location without moving. Every two minutes, the monitors record air quality data using two sensors inside each device by taking five second readings of particle concentrations in the air. Having two sensors within a single device allows users to check the reliability of air quality spikes by seeing if a spike shows up on only one sensor, which means it is likely a mistake, or if a spike is captured by both sensors, which means it is a true reading.

Environmental racism and residential segregation in Will County were huge factors in selecting air monitoring locations for this report. A 2009 study on residential racial segregation throughout Illinois found that Joliet is one of the most racially segregated cities across Black/White and Latine/White racial demographics in the Chicago metro area.<sup>24</sup> The single EPA monitor in Joliet is stationed at Pershing School, a school on the city’s West side Cathedral area which is 75% white and located further away from warehouses.<sup>25</sup> Therefore, this monitor does not adequately capture diesel pollution in the primarily Black and Latine communities in Joliet that are closest to sites attracting diesel trucks. Knowing that pollution can vary up to 800% from one block to the next,<sup>26</sup> it was critical to document air quality in affected communities.

Through roughly a dozen one-on-one conversations with long-term and

lifelong Will County residents, our team identified key locations for air monitoring to capture the hyperlocal pollution levels. In placing the Purple Air stationary monitors, we wanted to focus on areas along major truck routes that captured the predominantly Black and Latine working-class communities that are most affected—according to both national data and the anecdotal lived experiences of residents—by diesel pollution. We stationed four Purple Air monitors at four different locations.

The first monitor, named “Houston Ave,” was installed on one community volunteer’s home in Preston Heights, a residential area where 74% of residents identify as Black, Hispanic, or mixed-race,<sup>27</sup> that is located just off Route 66, a major truck route. Preston Heights is about a mile from Joliet’s two Amazon facilities, with Amazon being by far the largest employer in Joliet and attracting many diesel-fueled vehicles to their locations per day.

The second Purple Air monitor, named “Henderson Ave,” was placed in the Collins Street neighborhood of Joliet, which houses a large and growing population of Hispanic and Latine locals who, despite living further away from some of the major truck routes, report large numbers of trucks turning onto their residential roads and cutting through the neighborhood.

A third monitor, named “JJC Greenhouse,” was installed on the Joliet Junior College Greenhouse because it sits along another major road, Houbolt Road, and many young students congregate in and around that facility. This monitor is also located close to the Joliet Regional Airport, capturing compounded transportation-related pollution.

The final Purple Air monitor, named

“N Chicago/ E Mississippi Ave,” was placed just off of Route 66 in Elwood, IL. Elwood is an area of importance identified by Will County residents because of the controversial proposed logistics hub project introduced by North Point Development, a billion-dollar developer seeking to bring 3,000+ more acres of warehousing to Joliet and Elwood. Local community members have been fighting against the project for four years, citing that they live in an area where residents already complain about the cumulative burdens of diesel pollution and truck traffic.

AirBeam monitors were used to collect additional data at two mobile monitoring locations. The first monitoring location was at Nowell Park, which is along Route 53, a major truck route, and the site of a popular recreational facility and outdoor space for youth and families. The second monitoring location was at the intersection of Route 53 and Laraway Road, less than a mile from the two Joliet Amazon fulfillment centers, and where two highly trafficked Pilot and Food N Fuel gas stations draw countless warehouse workers and truck drivers on their way to and from work.

A rotating group of 25 community volunteers conducted the data collection at these locations in collaboration with WWJ organizers who oversaw the data collection. Each volunteer was given training and a guide for how to collect data (see appendix C for sample volunteer worksheets). We paired volunteers with a WWJ organizer to set up their AirBeam monitors at the beginning of their two-hour shifts. During the shift, the volunteers counted the passing Medium and Heavy Duty (MHD) semi-trucks as they passed using a handheld tally counter. We classified the trucks counted

using a chart provided, which instructed volunteers to include MHD semi-trucks with two to six plus axles in their counts. Mobile monitoring sessions occurred twice a day during rush hours, from 8 am-10 am and 4 pm-6 pm, and happened three times a week. The weekly schedule alternated between Monday/Wednesday/Saturday and Tuesday/Thursday/Sunday to monitor each day for four weeks. We monitored Saturdays and Sundays as a control, or a fixed variable which we could compare to workdays where more trucks are typically on the road, to see if more trucks correlated with worse air quality.

After the raw data was collected, a Python code cleaned and analyzed the AirBeam and Purple Air data to generate bar graphs that show differences in air quality, both throughout the day and over the course of the eight weeks. To properly

use the Environmental Protection Agency's Air Quality Index, we used an Air Quality Index conversion correction on the Purple Air Data. You can view appendix D for a detailed description of the data cleaning and Python coding processes.



# DATA ANALYSIS

## PURPLE AIR

The Purple Air data collected by community members was analyzed with two standards for air pollution in mind: the U.S. EPA 24-hour standard for ambient air quality because it is the regulatory body for the U.S., and the World Health Organization's 24-hour ambient air pollution standard because they are stricter. Both standards were referenced to draw attention to calls by global clean air advocates to create more stringent air pollution standards that are more consistent with public health research. These calls are reiterated references in the "Recommendations" section of this report.

Compounding environmental pollution from unregulated industries spurred environmental and community advocates to call on the Biden administration to lower the EPA's federal air pollution standards to mitigate the worsening health impacts from air pollution, which the World Health Organization (WHO) considers to be the number one environmental threat to human health.<sup>28</sup> The air quality regulations looked at in this study are set for PM2.5 ambient air pollution, a subset of which captures pollutants emitted by diesel combustion. The truck counting and air quality data in the AirBeam section in this report suggests a positive relationship between diesel combustion and PM2.5. Other known sources of PM2.5 include power plants, the burning of natural gas, and the presence of other polluting industries.

The World Health Organization's (WHO) ambient air pollution guidelines advise policy makers around the world in setting goals and regulations around air pollution control. PM2.5 pollution causes about 7 million preventable deaths per year, which WHO aims to cut back on by 80% with their revised air pollution standards<sup>29</sup> that tighten the 24-hour average PM2.5 threshold from 25  $\mu\text{g}/\text{m}^3$  to 15  $\mu\text{g}/\text{m}^3$ . Furthermore, the WHO states that the 24-hour limit should not exceed a daily average of 15  $\mu\text{g}/\text{m}^3$  of PM2.5 exposure for more than 3-4 days per year.<sup>30</sup> This 24-hour standard of 15  $\mu\text{g}/\text{m}^3$  is relatively stringent compared to the EPA's standard of 35  $\mu\text{g}/\text{m}^3$  of PM2.5. While we include the EPA standard as reference to the primary regulatory body for air pollution in the U.S., because the EPA standard is twice as lax as the WHO's, we feel that it does not adequately consider new research that suggests lowering thresholds and implementing more stringent standards that are key to protecting public health, especially during a respiratory pandemic.

The WHO and EPA PM2.5 daily average exposure standards are looked at to understand our study's Purple Air data. Our purple air sensors were sited at the following locations: Chicago and Mississippi Avenue in Elwood, Houston Avenue in Preston Heights, Henderson Avenue in East Joliet, and Joliet Junior College in West Joliet. The Purple Air graphs below show the

PM2.5 concentrations for each of the four locations. The black and white graphs on the left show the 24-hour average concentration of PM2.5 by day. The dotted and dashed horizontal lines show the EPA 24-hour standard (35 µg/m<sup>3</sup>) and WHO 24-hour standard (15 µg/m<sup>3</sup>), respectively. These graphs can be used to compare Joliet's daily average air quality to the EPA and WHO 24-hour standards. The multi-colored box plot graphs on the right represent all of the individual readings taken every two minutes throughout each day. The box represents the closest quarter of the data above and quarter of the data below the 24-hour mean, which is the line in the box. The lines above and below the box indicate the region where most of the rest (greater than 99%) of the data lie. The circles represent outliers, or individual two-minute readings that fall significantly outside typical

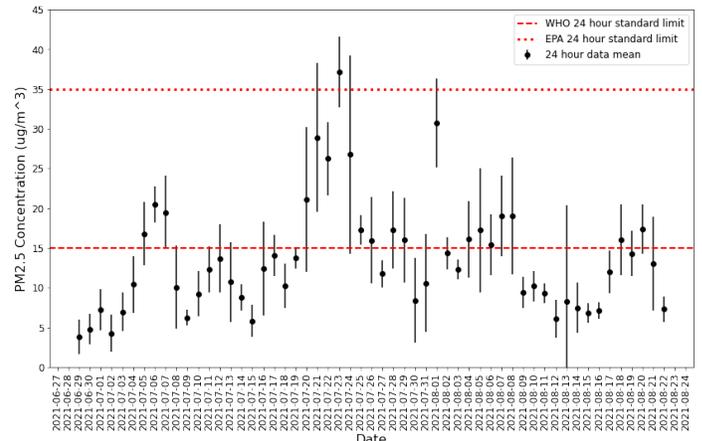
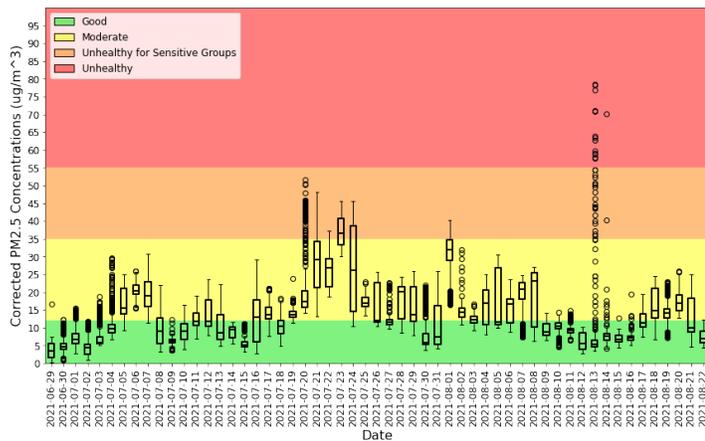
readings for the day. The background colors indicate EPA thresholds for good, moderate, unhealthy for sensitive groups, and unhealthy air quality levels.

The ability to observe outliers on the second graph can be used to identify more granular air pollution data. The strength of these commercially available air monitors is the ability to capture outlier data, in contrast to available public data from EPA monitors which are often not placed in the most-impacted communities and also tend to only provide daily or 12-hour air quality averages. As visible in the boxplot graphs, the daily average data tends to wash out information about spikes into unhealthy air quality levels. The constant data collection of the Purple Air monitors allows this report to highlight these spikes and validate community concerns about local air pollution.

Air Quality Index Category	Index Value	Breakpoint (micrograms per second, 24-hour average)
<b>Good:</b> Air quality is satisfactory, and air pollution poses little or no risk with 24 hours of exposure.	0-50	0.0 - 12.0
<b>Moderate:</b> Air quality is acceptable. However, there may be a risk for some people with 24 hours of exposure, particularly those who are unusually sensitive to air pollution.	51-100	12.1 - 35.4
<b>Unhealthy for Sensitive Groups:</b> Members of sensitive groups may experience health effects with 24 hours of exposure. The general public is less likely to be affected.	101-150	35.5 - 55.4
<b>Unhealthy:</b> Some members of the general public may experience health effects with 24 hours of exposure; members of sensitive groups may experience more serious health effects.	151-200	55.5 - 150.4
<b>Very unhealthy:</b> Health alert: The risk of health effects is increased for everyone with 24 hours of exposure.	201-300	150.5 - 250.4
<b>Hazardous:</b> Health warning of emergency conditions: everyone is more likely to be affected with 24 hours of exposure.	>300	> 250.5

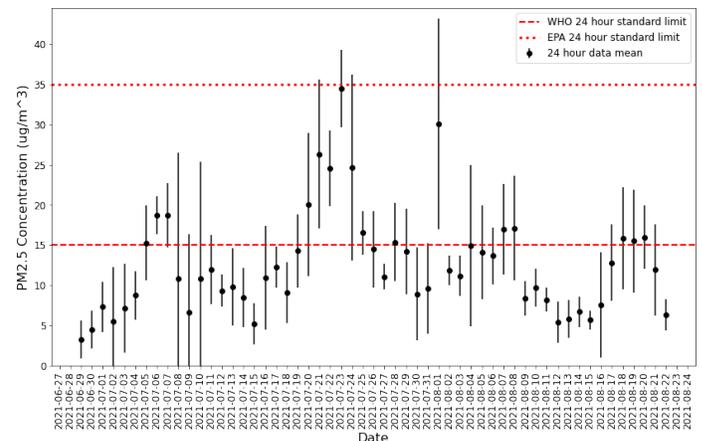
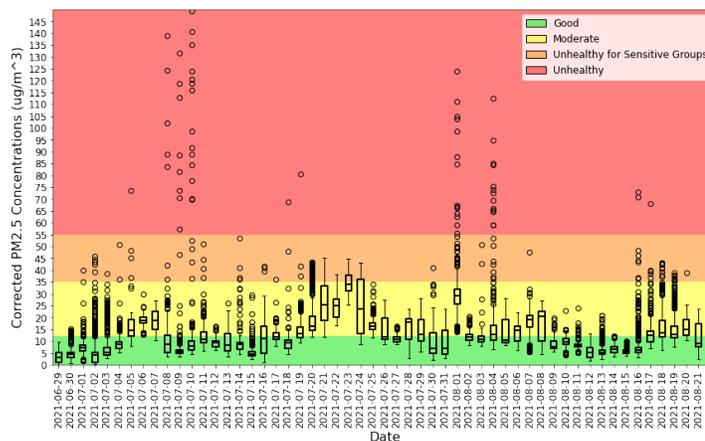
## N Chicago, E Mississippi, Elwood

This census tract in Elwood is 87% white and 6.7% of total population are below the poverty line, about the same as Will County's poverty rate.<sup>31</sup>



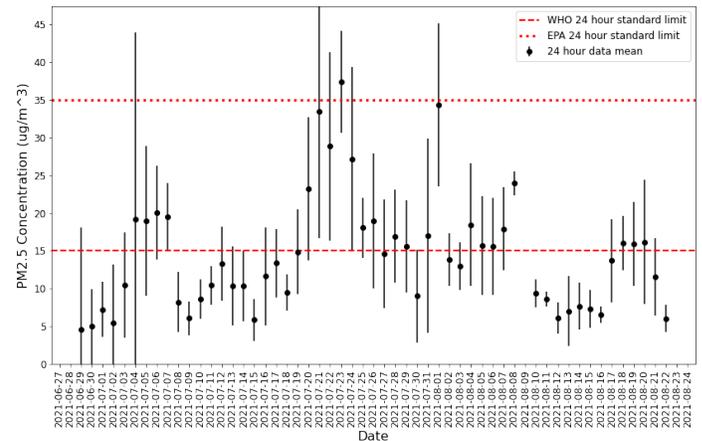
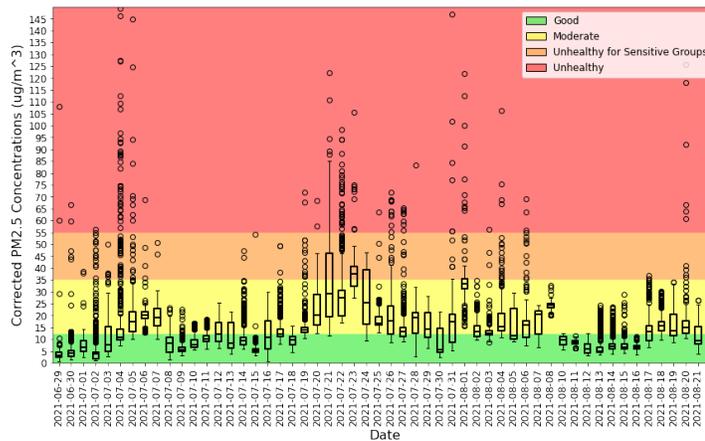
## Houston Ave, Preston Heights

In Preston Heights, 74% of residents identify as Black, Hispanic, or mixed-race. 22% of people are below the poverty line which is more than double the rate than all of Joliet and Will County.<sup>32</sup>



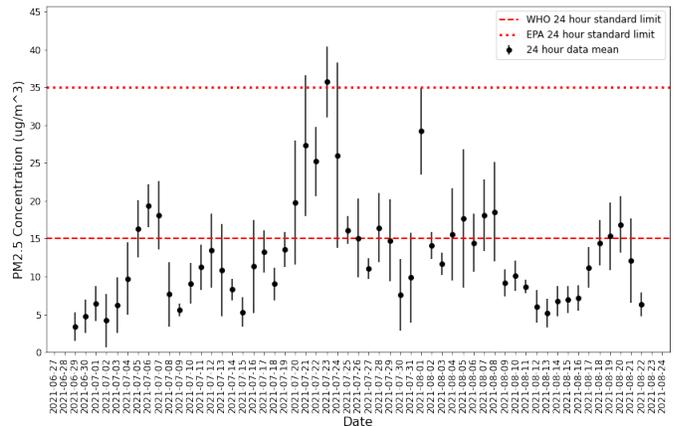
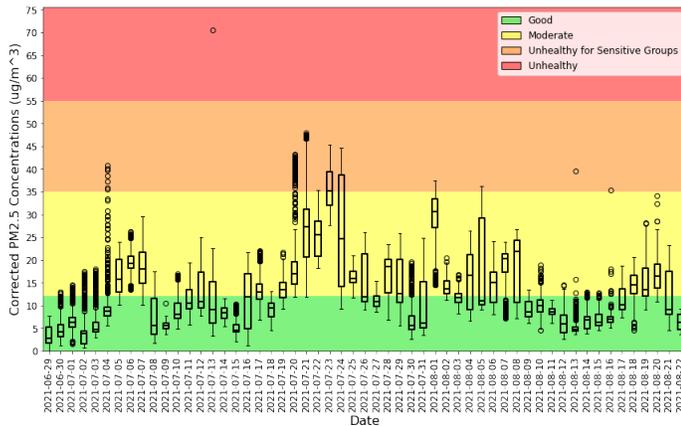
## Henderson Ave, East Side

This intersection on the East side of Joliet is in a census tract where 14% of the census tract is Black and 84% are Latine. 25.7% of people are below the poverty line which is more than double the rate than all of Joliet and Will County.<sup>33</sup>



## Joliet Junior College

Joliet Junior College is in a census tract where 57% of the census tract population is white, and 10.1% are below the poverty line.<sup>34</sup> Joliet Junior College students who attend classes and extra-curriculars on this campus and are impacted by air pollution as they go to school are demographically 41% students of color, and 40% of the student population is considered low-income.<sup>35</sup>



As evident in these data visualizations, each location experienced days during the 8-week period that showed significant PM<sub>2.5</sub> spikes. In some locations, several consecutive days exceeded the WHO standards for 24-hour average PM<sub>2.5</sub> levels, with some days also exceeding the much higher EPA standard. Every location well-exceeded the 3-4 days per year with an average PM<sub>2.5</sub> concentration above 15  $\mu\text{g}/\text{m}^3$  allowed in the WHO guidelines in just this eight-week period. Importantly, the data from the Houston Ave and Henderson Ave monitors, which captured air quality information in residential, minority-majority communities on the East and South sides of Joliet, consistently showed higher 24-hour averages and more PM<sub>2.5</sub> spikes reaching the moderately unhealthy and unhealthy air quality ranges based on U.S. EPA standards. These pollution spikes in the “unhealthy for sensitive groups” and “unhealthy for all groups” data ranges are particularly harmful for those with pre-existing respiratory conditions like asthma, COPD, and previous exposure to COVID-19. Although we do not have enough data to generate an annual overview for Will County, we can deduce that if these pollution trends continue, the annual PM<sub>2.5</sub> levels in Will County would surpass the annual standards of both the WHO (5 $\mu\text{g}/\text{m}^3$ ) and EPA (12 $\mu\text{g}/\text{m}^3$ ) annual standards.

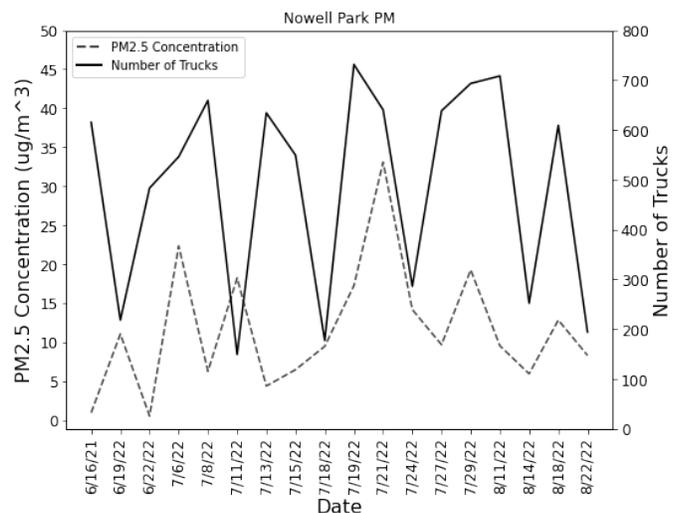
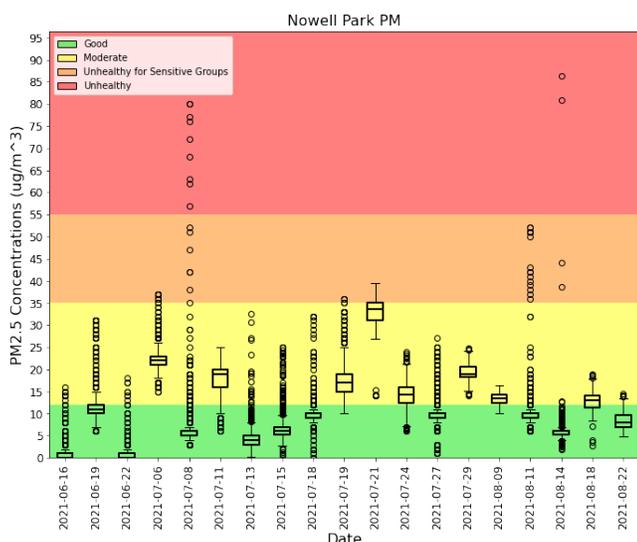
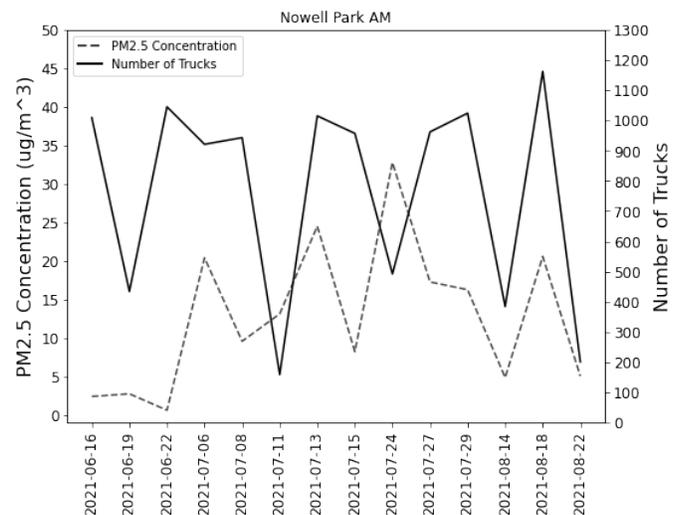
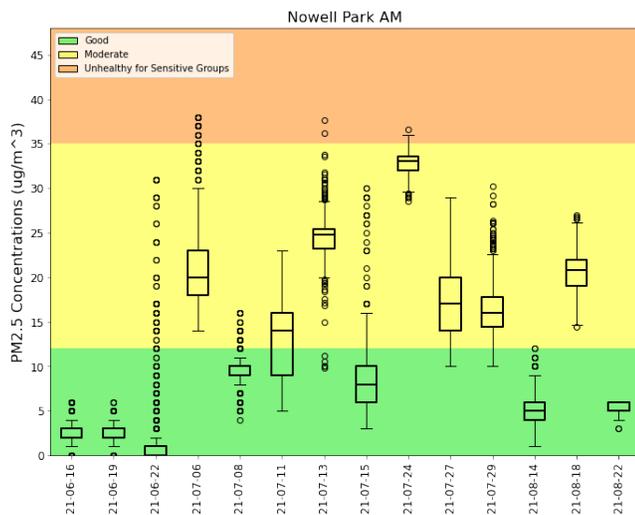
Our data and observations, coupled with our predictive analysis that suggest Will County is not only exceeding the 24-hour standard but the annual PM<sub>2.5</sub> standards as well, are concerning. Working-class Black and Latine communities living close to polluting industries are the most impacted by the negative health outcomes associated with air pollution because they are frequently experiencing harmful air pollution spikes, like our data illustrates. Moreover, in the case of warehouse workers and their families, their jobs are rarely providing adequate health insurance to diagnose and treat these cumulative burdens of PM<sub>2.5</sub> from diesel soot, other industrial pollutants, and social vulnerabilities that create poor health outcomes.

## AIRBEAM

The AirBeam data shows PM2.5 concentrations in two Joliet-based locations: Nowell Park and the intersection of Rt 53 and Laraway Road. Nowell Park is a community green space located between a truck route, the I-80 interstate highway, and a residential area that is 35% white, 31% Black, 29% Hispanic, and has nearly 1.5 times the poverty rate of all of Will County.<sup>36</sup> Laraway Road and Route 53 is a hub for truckers and warehouse workers to stop and fill their tanks or take a rest at one of the two gas stations at this intersection, which are on route to Joliet's two Amazon facilities. The AirBeam data does not have the EPA air quality index corrections used on the Purple Air data applied (see appendix D for EPA conversion details) since the monitors record PM2.5 concentrations on a shorter time frame, as opposed to the Purple Air monitors which captured data 24/7 for the entirety of our 8-week study. Shorter data collection windows mean that AirBeam data falls into specific air quality ranges, but we can speculate that it is likely they would produce similar results to the Purple Air graphs if they were monitoring over 24-hour periods.

There are two Box plot graphs per location which show average PM2.5 concentrations for each day of monitoring, split between morning and evening shifts. The two black and white graphs show average PM2.5 concentrations and average number of trucks per volunteer shift, split between morning and afternoon sessions.

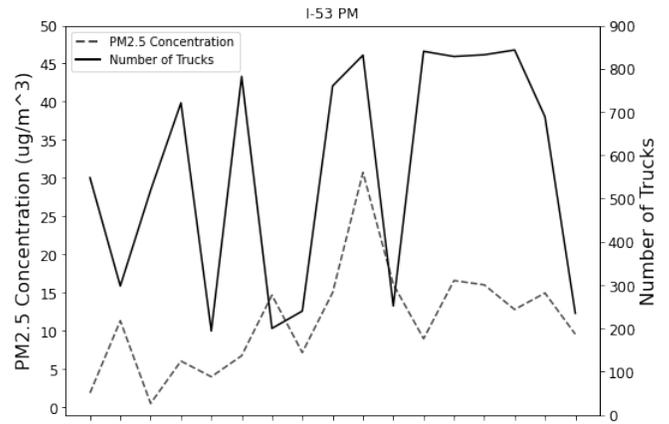
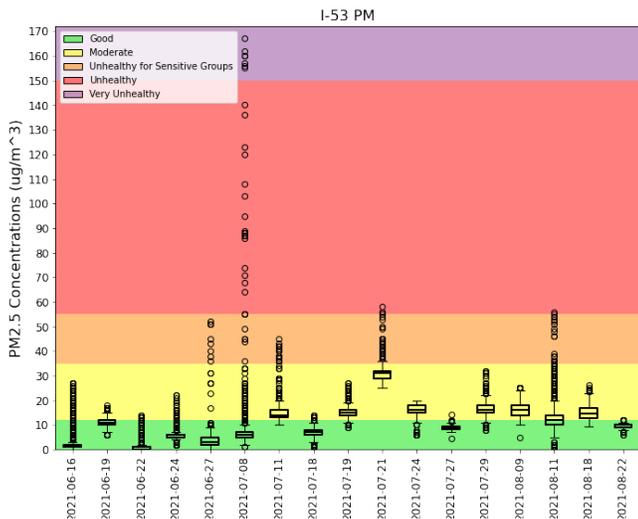
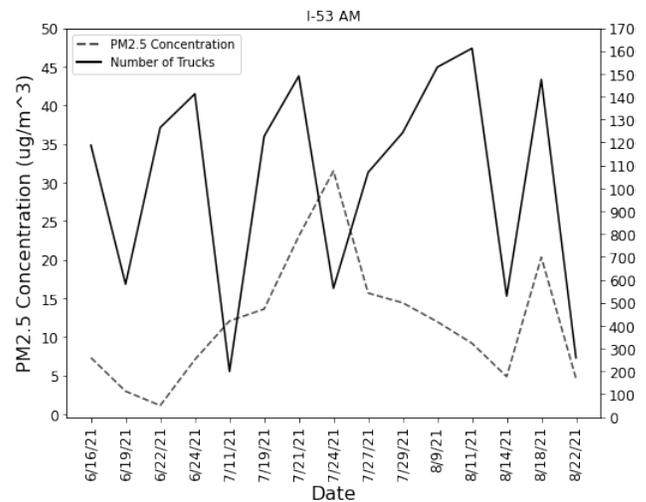
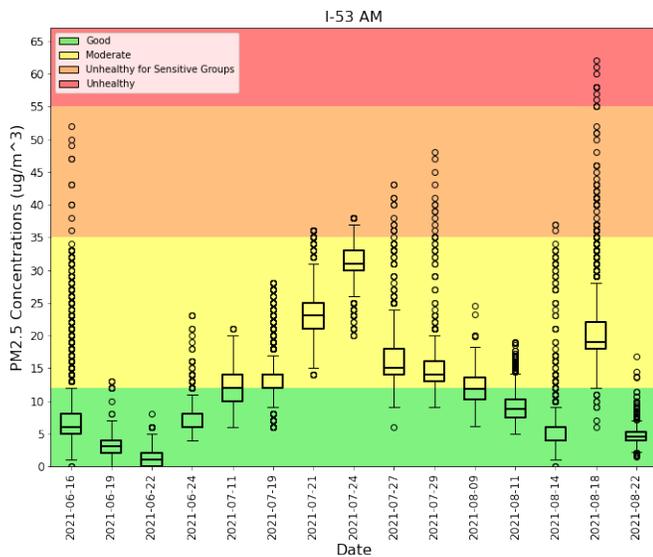
### Nowell Park



## Larraway & Rt 53

The AirBeam monitors are meant to capture the personal exposure of the user to particulates in the air. By pairing the AirBeam data with simultaneous truck counting, community volunteers were able to produce data that show a correlation between the number of diesel-fueled trucks observed during the shift with the amount of unhealthy particulate matter in the air. While there are too many other potentially confounding variables associated with mobile air monitoring of this kind to be sure what the exact cause of varying air quality is, trends shown in the line graphs do indicate a likely relationship between the number of trucks on the road and the amount of PM2.5 the volunteers measured in the air. Days with more trucks observed tended to, overall, show higher frequencies of “moderate” and “unhealthy” air quality. Moreover, the intersection at Larraway and Rt. 53, which saw more trucks on average than the Nowell Park intersection, showed more instances of air quality in the ranges of “unhealthy for sensitive groups,” “unhealthy,” and even some instances of “very unhealthy” air quality.

Based on observations from air monitoring volunteers, factors such as wind speed, wind direction, as well as whether trucks are idling or moving seem to also have an impact on the numbers. These anecdotal observations will be investigated more deliberately in future air monitoring studies.



# INTERVIEW 1: JAY

WWJ organizers met Jay as frequent customers of a favored Joliet cafe, where we struck up conversation about life on the East side as he took coffee orders from behind the bar. Tired of working warehousing and fast-food jobs, he landed work as a barista in downtown Joliet, a job that he loves for its community interaction. His job at a small business is drastically different from his past jobs working for major national corporations. “The environment was very gloomy,” he describes of the warehouse floor, “just from the fact that there’s a lack of windows. And even though there are little, tiny windows, they’re always really tinted. The air quality was always very bad, and I would go home — or even go to the bathroom — and clear my nose, and there would be little dust particles everywhere.” Jay knows that the warehousing industry dominates the local job market, and even if the jobs themselves are especially back breaking or even dangerous, people are not left with many options in their job search in Will County.

Some of his first warehousing jobs he shared with his mother, who has worked in the warehouses for ten years, or about half his life. His mom is adamant about wearing a mask at work even without an enforced mask mandate. She uses the mask not only as protection from COVID-19 but also to preserve her lungs from dust particles. “She was upset with me personally because I didn’t like wearing my mask because of my asthma. It would affect me a lot greater than just if I were any other person.” Moving boxes covered in a week’s worth of dust is not healthy work for anyone, especially someone with a chronic lung condition like asthma. Whether it was an industry giant like Amazon, or a smaller warehouse, he said the air quality was bad inside of nearly every facility he worked in because of poor ventilation and inconsistent cleaning schedules. “[The warehouses] found the easiest way out. The cheapest way out.” Cutting back on maintenance and janitorial services is one of the ways the warehouses cut corners on operating costs to maximize profit.



Since leaving the warehouses, Jay's asthma does not flare up as often. "I remember I'd cough up a lot of mucus and stuff, and I thought it was because I was smoking, and my mom would say it was because I was smoking. But now I smoke more, and I don't have those problems. So, I think it was the air quality." Jay says, "Every so often I'll be driving by, and I'll be like, 'that's a lot of semis,' like not necessarily on the highway because that's where you'll expect to see them, but on the surface streets over here. There's always fucking traffic jams because they're always trying to get through to the surface streets... It's crazy."

When asked about local polluters, one of the first things Jay mentioned was a suspicious cement mixing facility on his route to work. "I'll have my window down because I usually do, and it'll smell really bad. It'll be some kind of chemical smell." The cement industry is the culprit of emitting large deposits of the greenhouse gas carbon dioxide, another toxic chemical that can pollute surrounding communities. While this report does not cover the environmental and health effects of the cement industry, air pollutants like carbon dioxide mix with diesel particulate matter to create a destructive cumulative impact on the public's lung, heart, and brain health.

Aside from the air pollution, truck traffic poses another physical danger. Regularly, Jay is caught in traffic jams in residential areas, sometimes behind a row of semi-trucks that veer from designated truck routes and onto local roads. Jay wonders, "What are you doing over here?" as trucks drive past his house and pose a physical safety threat to residential homes and local drivers. Truckers' pay rates differ, sometimes getting paid by the mile or per load instead of earning an hourly wage. Without a load, many drivers don't receive a cent for the miles they drive, so it may be the case that some drivers cut through residential areas to make the most money as they pick up and drop off a load as quickly as possible. "You're not making any money," Jay remarks. Payment practices that pressure workers to cut corners and put communities in danger point to a flawed labor practice.

Jay believes that this relationship between labor and environmental injustice, where the same systems exploiting truckers at work also forces truckers to contribute to pollution in residential neighborhoods, must be tackled in any successful plan to

**“ THE AIR QUALITY WAS ALWAYS VERY BAD, AND I WOULD GO HOME – OR EVEN GO TO THE BATHROOM – AND CLEAR MY NOSE, AND THERE WOULD BE LITTLE DUST PARTICLES EVERYWHERE.**

address community issues. When he imagines a future of environmental justice for his community, he pictures a local economy with “a better environment for workers,” with “livable wages so that [workers] don’t have to live in constant stress.” For him, cleaning up the environment is just a first step, and then we need to ask, “now that we’ve reduced our emissions to the environment, how can we make our personal lives better? How can we make our jobs better?”

Not only does his vision include truck drivers, but it also includes manufacturing workers too. He says that any electric vehicle manufacturer looking to set up shop in Will County, “would be a good way to counteract the pollution, but at the same time a bigger facility would just magnify the problems that current warehouses already have. So, I feel like it’ll cut down emissions and fog, but there wouldn’t be a change for the warehouse workers.” Jay is skeptical about a new industry, albeit a green industry, that does not make a firm commitment to the working people it will employ.

This skepticism of the warehouse industry is widely felt by Joliet residents who were told by bought-off elected officials and corporate tycoons that Joliet’s two Amazon warehouses would generate hundreds of good jobs and stimulate the local economy. After receiving massive tax breaks to build the facilities, Amazon employed residents who quickly learned that the new industry only offered a revolving door of underpaying, unsustainable, and unsafe jobs. The skepticism is only deepened because none of Illinois’ lawmakers or Electric Vehicle (EV) manufacturers have committed to allocating Joliet-made clean vehicles to the streets of Joliet. Ultimately, Jay says that the switch to zero emissions needs to start in his community. For Jay, electrification can be fair, but only if it is, “helping the people who are in need the most. And realistically, throughout the whole city [of Joliet], the East side needs it the most.”

**“ I REMEMBER I’D COUGH UP A LOT OF MUCUS AND STUFF, AND I THOUGHT IT WAS BECAUSE I WAS SMOKING, AND MY MOM WOULD SAY IT WAS BECAUSE I WAS SMOKING. BUT NOW I SMOKE MORE, AND I DON’T HAVE THOSE PROBLEMS. SO I THINK IT WAS THE AIR QUALITY.”**

# NATIONAL MOVEMENT FOR ELECTRIFICATION

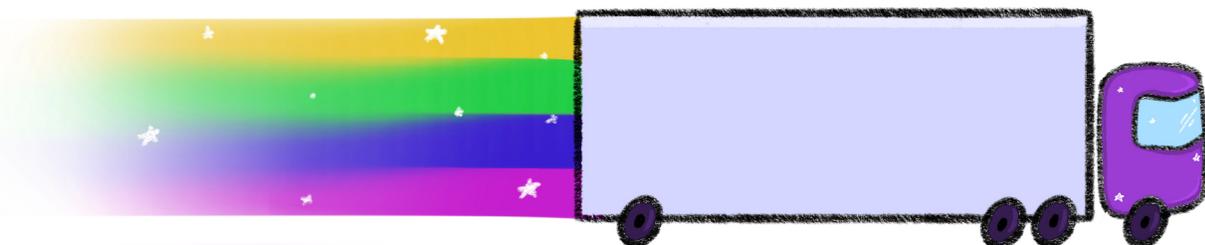
The community-led push for freight electrification is a nationwide movement responding to critical concerns about the environmental degradation and devastating health impacts of heightened diesel pollution in the predominantly Black and Brown working-class communities at the fenceline of major industrial hubs. Directly impacted residents in port-side environmental justice communities across the country, from California to New Jersey, have come together with their neighbors to stand against the negative impacts freight systems have on their communities and the larger environment.

Just one example of the vibrant and multi-faceted movement for freight electrification is the Moving Forward Network (MFN) in which Warehouse Workers for Justice participates as one of over 50 member-groups. The MFN is a national network that “centers grassroots, frontline-community knowledge, expertise and engagement from communities across the US that bear the negative impacts of the global freight transportation system.”<sup>37</sup> This network connects grassroots organizations across the country

with academic partners, national environmental groups, and other electrification advocates to form cross-regional connections and build power in service of environmental justice in communities impacted most by freight emissions.

To fully understand the fenceline-led movement for freight electrification, it is important to recognize that the communities living closest to freight hubs are often experiencing many compounding social issues at the intersection of poor air quality, climate catastrophe, economic injustice, and systemic racism. Diesel pollution therefore acts as a compounded burden on top of existing inequities, worsening quality of life and health outcomes for communities already experiencing a lion’s share of these concerns.

Also of note is the importance of centering community expertise in a successful movement for freight electrification. Because of existing disparities in communities most affected by freight emissions, as outlined above, there can sometimes also be a lack of accurate data collected by regulatory agencies meant to monitor air quality, pollution, and carcinogens.



This has led many communities like ours to launch their own grassroots-driven air monitoring projects, as well as to take on other forms of information-gathering, through FOIAs or other means, to collect data that uplifts the lived experiences of residents on the ground.

In recent years, as more national studies have built upon the important work of community-led research projects by looking at the disproportionate environmental and health impacts of freight emissions, the data has overwhelmingly uplifted what residents in fenceline communities already know to be true: that the massively wealthy corporations at the top of logistics supply chains operate under deliberate patterns of environmental racism by primarily polluting working-class communities of color. For example, in a recent Consumer Reports investigation from December 2021 that tackled Amazon's unprecedented and unfettered expansion,<sup>38</sup> data showed Amazon opens most of its warehouses in neighborhoods that have disproportionately high numbers of people of color and low-income residents relative to their metro area. Nationally, 69% of Amazon warehouses have more people of color living within a one-mile radius than the median neighborhood in their metro areas. Many of these are communities where other industrial facilities already cause residents to worry about poor air quality, excessive noise, and traffic.

Despite the valuable increase in formal studies related to corporate freight pollution, it should be noted that the expertise of directly impacted residents must be centered in any successful movement for freight electrification. Often, directly impacted community members are already keepers of important knowledge about which areas suffer the most

from air pollution and how this pollution affects public health outcomes for them, their families, and their neighbors. Thus, they can guide every area of electrification advocacy from directing data collection, educating about the widespread effects of freight systems in their neighborhoods, and conveying information to their neighbors in ways that are relevant and engaging. Residents carry immense expertise within their lived experiences, which translates to capacity for building out robust solutions that are the most effective plans for their communities.

# INTERVIEW 2: BILLY JOE

Billy Joe comes to the Warehouse Workers for Justice office in Joliet bright and early in September. As he enters, he lingers at the bulletin board next to the entrance to read the newspaper clippings and mementos of past Warehouse Workers for Justice actions and workplace fights. Billy Joe, a lifelong Joliet resident and truck driver, knows WWJ from his time as a Walmart warehouse worker in the 2012 workplace fight to stop wage theft and unfair labor practices inside their Elwood warehouse. He remembers the fear of losing his job if he joined his coworkers on the picket line. Walking into work every day, past friends and coworkers striking for the wages they deserved, Billy Joe eventually realized that his allegiance was to his coworkers instead of the employer that was stealing from them all. Billy Joe is no stranger to the concept of coming together with your community to build power in numbers, so when we met at a gas station in June 2021 to talk about the campaign for clean air and good jobs across the supply chain, he didn't bat an eye. At least, not until we mentioned electric trucks.



As a former warehouse worker who spent years circulating through some of the major facilities across Will County—Dollar Tree, Walmart, Home Depot, to name a few—Billy Joe knows the warehouse and logistics industry well. He talks about warehousing with an anger and distaste that eleven years of professional driving has not subdued. At one warehouse, he was required to work twelve-hour days with only two 15–30-minute scheduled breaks. “They don’t do right by the workers,” he explained. “They mistreat [warehouse workers,] they fire them, and it’s always hire, fire, hire, fire. It’s like a wheel in there, and that was one of the reasons that I got out of the warehouses... because either they work you too long, not giving you your breaks or, you know, it’s always something.” It is no surprise that truck driving appealed to him after years of such mistreatment. “I didn’t have to have a boss watching me, and you know, picking with me, and I’m here by myself... [I] make my own schedule. I’m off when I want to be off, and I go out of town when I want to go out of town.” He swears to never return to a job inside a warehouse.

Billy Joe drives regionally from the logistics hotbed of Will County to places around the Midwest, sometimes going as far south as Texas if the job pays enough. He drives with his brother's trucking company, GNT Logistics, which is about eight years old and is fully staffed by Billy Joe and his brother's wife, who is their dispatcher. He also drives for two other companies as a "spotter." Spotters are vehicles used to cart goods to and from the warehouses themselves. Spotter trucks are not certified for road use, and these jobs keep drivers on-site at the warehouses, usually idling as warehouse workers load the trucks up. Between all his jobs, he's provided health insurance, life insurance, and a reliable income that supports his family while supporting his brother's business. For him, juggling three driving jobs is still better than any of his warehousing jobs in Will County. He proudly mentions he is planning to own a fleet of trucks as soon as he finds a few drivers and a dispatcher.

When asked about a transition to electric trucks, he says he cannot imagine them on the roads, especially for long-haul driving. He understands how immensely electrification would overhaul the current trucking infrastructure, and his disbelief in such a sweeping change reflects that of most truckers we speak with in Will County. The charging infrastructure, the life of the truck batteries, and the mechanics are some of the many concerns he and the other truckers express with frustration. This technological advance reminds him of a relatively recent change in the trucking industry when the technology shifted from manual to automatic trucks — a change that many truckers disdainfully remember for the lack of training and decision-making power truckers were given. Billy Jo, for example, still strictly drives stick shift because it gives him more control on an incline and a more engaging long-haul driving experience with switching gears. "Automatics are here. I have seen them; I have driven them. But electric? Maybe — maybe it'll work. It's good for the air and everything, I understand, it's a lot of good. As far as getting real truckers to drive those things? It's gonna be a real problem." Even when asked what he thinks of training programs for truckers or rebate programs for small trucking companies to invest in electric trucks, he denies electric vehicles would be a viable option for his trucking career.

**“AUTOMATICS ARE HERE. I HAVE SEEN THEM, I HAVE DRIVEN THEM. BUT ELECTRIC? MAYBE — MAYBE IT'LL WORK. IT'S GOOD FOR THE AIR AND EVERYTHING, I UNDERSTAND, IT'S A LOT OF GOOD. AS FAR AS GETTING REAL TRUCKERS TO DRIVE THOSE THINGS? IT'S GONNA BE A REAL PROBLEM.**

In his time off between his three driving jobs, he is with his two young daughters in Joliet. Billy Joe is a family man and says his girls give him two reasons to consider electrification's positive impacts on the future of the environment. The drastic weather changes from climate change do concern him very much. "It has changed a lot... when I was growing up here. We had snow, like real snow. You know, cars are always blocked-in snow. We don't have snow like that anymore... I remember the steel mills back in the day; you know smokestacks, you know it was bad here... since they closed those places up, I think the air quality shoulda been better, but you got the trucks, and you got everything else, I think it's always gonna be something, I think it's always gonna be some type of pollution." Billy Joe knows that the companies at the top of the supply chain make "billions of dollars"- more than enough to invest in cleaner technology that would create healthy and safe communities for residents and workers. He also knows that if corporations are not forced or pressured to take money from their pockets, "if they don't have to," they will not. When asked if this is fair, Billy Jo says "no" without hesitation. "I think it's selfish, actually."

Like many people in Will County, Billy Joe has had enough of the logistics industry's extractive business models that keep working communities of color in poverty-wage jobs and toxic environments. Despite his hesitation to commit to driving an electric truck soon, he wants cleaner air and better working conditions because he knows that's what his daughters, friends, and community deserve. Billy Joe also expresses a remarkable sense of solidarity with warehouse workers and would support an electrification transition that would improve the warehouses. Going from a warehouse worker to a trucker is common in the logistics industry, and many other truckers have expressed solidarity even if they haven't seen the inside of a warehouse in years, even if they are not fully convinced electric trucks can adequately haul freight. Billy Joe wonders, "how they're trying to go about doing [electrification] and how to convince a person like me to get in that truck."

**“THEY MISTREAT [WAREHOUSE WORKERS,] THEY FIRE THEM, AND IT'S ALWAYS HIRE, FIRE, HIRE, FIRE. IT'S LIKE A WHEEL IN THERE, AND THAT WAS ONE OF THE REASONS THAT I GOT OUT OF THE WAREHOUSES... BECAUSE EITHER THEY WORK YOU TOO LONG, NOT GIVING YOU YOUR BREAKS OR, YOU KNOW, IT'S ALWAYS SOMETHING.”**

# JUST TRANSITION TO ELECTRIFICATION

Just transition can be a framework to understand a fair economy and healthy environment as interrelated pieces of a vision for a better future, in which working people have well-paying, family-sustaining jobs that help resuscitate communities from suffering caused by the climate crisis. The Just Transition Alliance defines this concept as “a principle, a process and a practice. The principle of just transition is that a healthy economy and a clean environment can and should co-exist. The process for achieving this vision should be a fair one that should not cost workers or community residents their health, environment, jobs, or economic assets.”<sup>39</sup> Visions like the one a just transition offers might help residents understand electrification as an opportunity for workers to gain footing in a changing economy. Green technology like electrification that combats climate change is only as good as its ability to involve and uplift communities and workforces who have been impacted most by dirty industries. Otherwise, current trends of clean air disparity, where wealthier and whiter communities breathe cleaner air than working-class communities of color, will be perpetuated by clean energy transitions.

Will County residents know well about the truck traffic that clogs major and minor arterial roads, highways, and neighborhoods. People see family members and neighbors fall sick with lung, heart, or brain conditions as others clock into a job without lifesaving health care. The ware-

house and subsequent truck problems are grave, and many community members believe the industries owe the surrounding communities clean air investments. Electrification can improve local air quality and quality of life for working communities, but only if community expertise guides the policy-making that will shape electrification. This includes community input on where to build out charging infrastructure and EV deployment. Community expertise can be a tool that sculpts avenues to new data that highlight geographic locations experiencing high concentrations of pollution-related issues. To integrate the knowledge of truckers, warehouse workers, and residents on the ground within policy-making processes, questions about charging, battery life, mechanics, cost, and implementation must be addressed to make a just transition to electric vehicles possible in Will County.

In the workplace, the just transition framework centers the voices of workers whose jobs will radically transform by the promise of clean energy industries. Bearing in mind that the jobs of truckers and some warehouse workers might look quite different in an electrified world, looking to workers to provide leadership on what their needs will look like around training, affordability, and working conditions is a way to ensure a fair progression to EVs. Just transition advocates within the labor movement often say that while “transition is assured, justice is not.” By taking cues from the

knowledge and lived experience of workers, we can orient ourselves towards just jobs and workplaces in the shift to EVs.

In the community, a just transition framework prioritizes community education, knowledge-sharing, and leadership. So far, the average person is not familiar with what electrification is, how the industry is growing in Illinois, and how this will affect life, work, and community even as companies ramp up production of EV's for personal and industrial class use.<sup>40</sup> Since companies' top priority is the bottom line, they do not have an incentive to provide popular education about the use, mechanics, and benefits of EV trucks necessary for owner-operators to invest in the vehicles themselves, nor to prioritize deployment in diesel-laden neighborhoods. This lack of knowledge is the cause for a lot of confusion and misinformation about what electrification means. There are also some immediate, real barriers to learning about EVs such as the cost. The upfront cost of a new EV is much more than that of a diesel-fueled vehicle, which excludes most independent trucking agencies or owner-operators who cannot afford to make the switch themselves. Because the profitable warehouse and logistics industry disproportionately contributes to transportation-related pollution with freight trucks, they must be held responsible for major clean air investments in Will County, taking the burden off individuals to pay for expensive EVs and placing it onto the parent company. A just transition to electrification would include a robust incentive or rebate program that would allow independent truck drivers, especially those operating in fenceline communities most burdened by truck pollution, to be some of the first to electrify.

A just transition to electrification would be one where communities closest to industrial hubs are prioritized in the construction of charging routes and charging stations – EV infrastructure projects in which the corporate polluters should invest heavily. In addition, all state and federal EV funds should be granted to private companies on the condition that they improve working conditions for workers across the supply chain, from warehouse workers to truckers to EV manufacturers to mechanics. If lawmakers do not take recommendations for a broad-based just transition seriously, the existing racialized disparity in clean air and good jobs access will worsen. Specific examples of how Will County can begin a just transition to electrification are laid out in the “Recommendations” section of this report.



# INTERVIEW 3: ERIC

Eric grew up just outside of Illinois' Northeastern border in Hammond, Indiana where the EPA found high levels of lead and cadmium air poisoning - toxins that can lead to brain damage and lung disease - traced back to nearby smelting and scrap metal facilities. "Near where I grew up there were a lot of trucks and... just all sorts of [polluting] activity would happen because we lived right next to a big busy bridge, so we'd get a whole bunch of cars, obviously. And it's strange because I said last time I went back there, and you can just smell how bad it is. And it's weird 'cause actually, growing up there I didn't notice the smell, and I actually ended up having



asthma growing up." Remarkably, his asthma faded after his parents picked up and moved the family to Joliet when he was about thirteen, in search of a better school system. It was as an adult that he discovered that his family left the toxic pollution in Hammond to face an unknown source of air pollution in Joliet: the medium and heavy-duty trucks used by the warehousing and logistics industry. "It's weird when you think about how life comes around," Eric remarks, "we left to get away from that, and now grown up I'm seeing all of these trucks it's almost like there's really no difference."

Eric works at an Amazon fulfillment center in Will County, where he does general labor on the shop floor, sometimes unloading boxes from the semi-trucks that pull into opposite sides of the warehouse. He never thought too much about the dangers of daily exposure to diesel fumes, but knows, "it's impossible not to get [exposed to diesel pollution] because there are so many trucks. And if you're standing in the trucks, I'd imagine it's worse 'cause there are a bunch of other trucks pulling up and reversing, so I'd imagine all those fumes are getting pushed up in those cracks." It comes as no surprise that the diesel fumes go unnoticed at work, since diesel particles measure out to one-twentieth the diameter of a strand

of human hair. Diesel pollution is invisible and requires an air monitor to accurately detect it. Any amount of exposure to these microscopic pollutants is unhealthy and can be considered especially dangerous to those with chronic lung conditions.

Eric is an expert on the common injustices that can take place inside a warehouse. As a nineteen-year-old, he worked at the MDW4 Amazon facility in Joliet, where he was fired without notice after going to the doctor for a work-related injury.

“I was working 11-hour days and, uh, that just eventually caused issues with my back... with the doctor’s note and everything I gave to them and emailed them like daily-almost daily. As many updates as I can give, and... provide paper evidence and stuff and still, they didn’t get back to me, and then one day I just got fired. And after that, I ended up calling, saying ‘hey what happened? You’re firing me for a medical reason?’ They said, ‘oh we’ll get back to you in the next few days. We’ll call you.’ And then they just never called. And so, after that, I kinda started believing that HR is kinda useless and the only way to solve a problem is to just not have one.”

He is critical of the industry for treating their employees like machines instead of humans and feels nervous about the detrimental environmental impacts warehouses have on his Joliet community. “I worry about the level of pollution,” he says, “Because growing up I lived in a low-income place, and it was just always there. And even now where I drive, through all the low-income spots, [they] are like perfect territory for a bunch of trucks for some reason.”

The East side of Joliet, where Eric spent his teenage years and where he currently lives with his wife, is surrounded by warehouses that employ many East siders. Truck routes and a major highway, Interstate 80, cut through the East side. The larger and local arterial roads lead semi-trucks in and around neighborhoods, school grounds, and parks to either deliver or pick up a load at a warehouse, or at the intermodal port, spewing toxic fumes into community spaces along the way. Cleaning up the air on the East side is a priority for Eric. He explains, “it is imperative to include low-income communities as well, rather than limiting the greener pastures to those who can afford the view.” If

**“ THE AIR QUALITY WAS ALWAYS VERY BAD, AND I WOULD GO HOME – OR EVEN GO TO THE BATHROOM – AND CLEAR MY NOSE, AND THERE WOULD BE LITTLE DUST PARTICLES EVERYWHERE.”**

electrification is not implemented in frontline communities where the air is poorest, the transition to zero emissions trucks will deepen environmental injustices that already exist.

As a warehouse worker, he wants companies who are investing in technological advances to additionally invest in their workforce. As clean energy jobs grow in Illinois, they will require new skills from workers and open new job markets.

“As an Amazon employee during such a time of crucial technological change, the best way for such a profitable business to invest in green technology and therefore our future is to invest in its workers; giving them the resources needed to adapt and not only survive in a greener, more electric world, but also to thrive. Promoting various training programs from within the company is important... A great way for a good business to invest in the future and its workforce would be to make sure everyone enters the future, allowing for equal opportunity for growth in the new fields of work to come, rather than focusing on those already born into it.”

Eric’s vision for environmental justice in his hometown includes a transformed warehousing industry that lifts its workers up, and that considers and stays accountable to the surrounding communities. “We don’t really know what the world would look like if we transferred [to electric] entirely, and it didn’t seem possible growing up but it’s exciting we’re born in the time it’s transitioning to good, clean energy. I don’t know, I’m just excited.”

**“AS AN AMAZON EMPLOYEE DURING SUCH A TIME OF CRUCIAL TECHNOLOGICAL CHANGE, THE BEST WAY FOR SUCH A PROFITABLE BUSINESS TO INVEST IN GREEN TECHNOLOGY AND THEREFORE OUR FUTURE IS TO INVEST IN ITS WORKERS; GIVING THEM THE RESOURCES NEEDED TO ADAPT AND NOT ONLY SURVIVE IN A GREENER, MORE ELECTRIC WORLD, BUT ALSO TO THRIVE. PROMOTING VARIOUS TRAINING PROGRAMS FROM WITHIN THE COMPANY IS IMPORTANT... A GREAT WAY FOR A GOOD BUSINESS TO INVEST IN THE FUTURE AND ITS WORKFORCE WOULD BE TO MAKE SURE EVERYONE ENTERS THE FUTURE, ALLOWING FOR EQUAL OPPORTUNITY FOR GROWTH IN THE NEW FIELDS OF WORK TO COME, RATHER THAN FOCUSING ON THOSE ALREADY BORN INTO IT.**

# LABOR CONSIDERATIONS IN WAREHOUSING, DISTRIBUTION, AND MANUFACTURING

It cannot be forgotten, in the exploration of environmental effects of the warehousing, distribution, and logistics industries, that these industries have another far-reaching direct impact on communities: on the livelihoods of workers in these industries, as well as the economic stability of the workers' families and broader community. Key corporate players in these industries have had some of their most profitable years ever during the pandemic<sup>41</sup> thanks to the labor of essential workers in the warehouses and trucks. Record breaking profit margins would have been impossible without the tireless efforts of workers who risked their lives to go to work during a pandemic. Across the industry, workers have (1) seen continued low wages<sup>42</sup> and unlawful wage and hour violations,<sup>43</sup> (2) had their hazard pay denied or cut amid the pandemic<sup>44</sup>, and (3) faced unsafe<sup>45</sup> and even deadly<sup>46</sup> working conditions.

In conversations around the labor and environmental effects of warehousing, there is often a false dichotomy presented between the experiences of warehouse workers and the experiences of residents. This false division assumes issues on the jobs as separate from the issues in the community. For Will County communities, and for many others at the fenceline of major warehousing hubs, there is often no metaphorical line separating one impacted group from another. Predominantly Black, Latine, immigrant and working-class communities in particu-

lar—who make up both most warehouse workers<sup>47</sup> in Illinois and most residents<sup>48</sup> impacted first and worst by environmental injustice—face a kind of “double jeopardy” at the hands of the distribution and logistics industries in the region, where vulnerable communities face compounding oppressions from workplace injustice on the job and from environmental degradation in their neighborhoods.

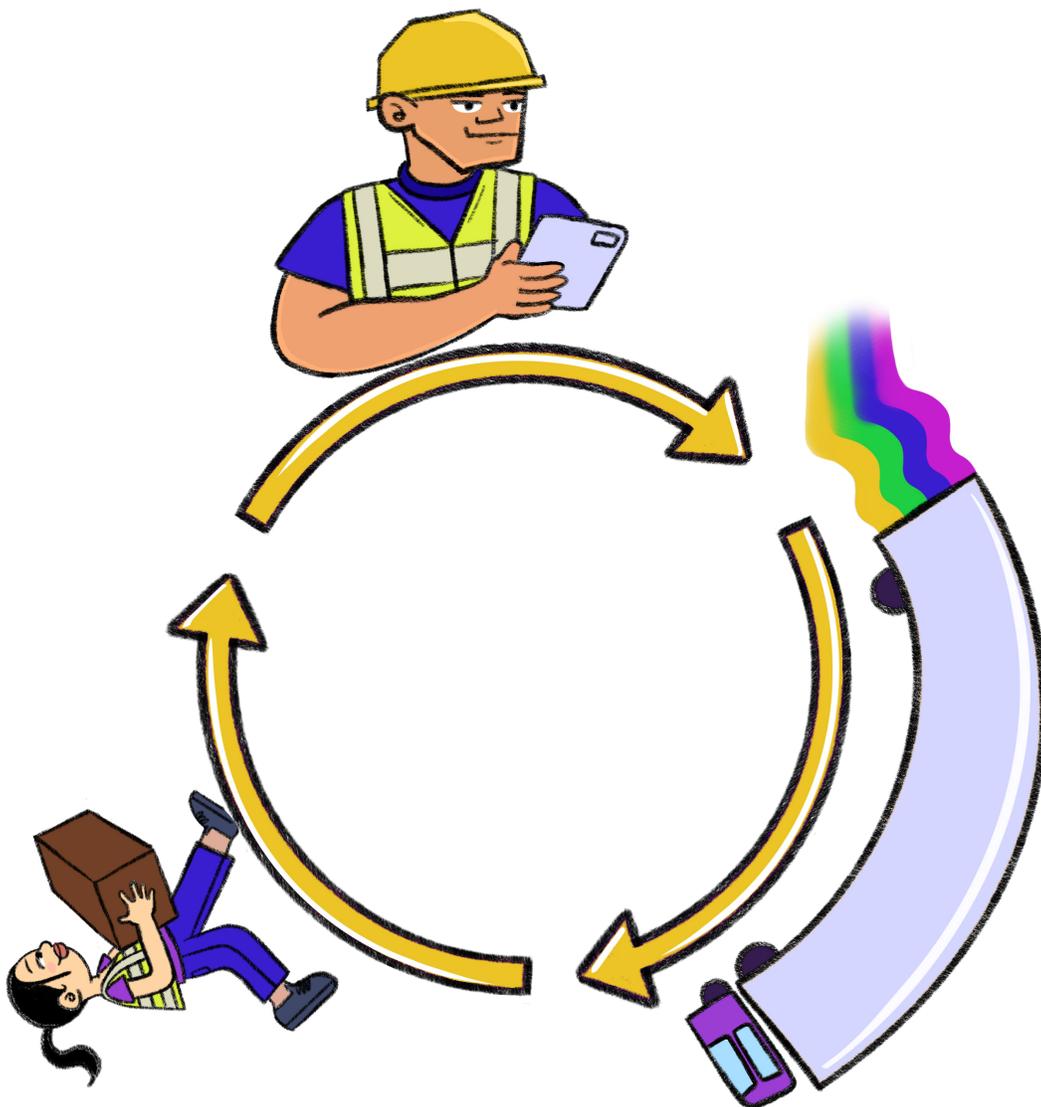
Thinking about the impending future of electrification across these industries also brings another employer consideration into the mix: the electric vehicle manufacturing industry. Will County is not only home to the largest inland port in North America, attracting hundreds of warehouses and trucks to the region, but it has also been recently named the future home of a Lion Electric plant that will be the largest medium and heavy-duty electric vehicle manufacturer in the country. Following this announcement, it has become increasingly important to conceptualize the community's relationship with EV manufacturers as both EV producers and as employers of residents. Despite heavily advertising the opening of their Joliet plant, Lion Electric has not publicly made any commitments to creating quality jobs or putting in place fair hiring practices for the local community.

Lion Electric is not the only EV manufacturer nationwide that has failed to roll out quality jobs plans. The stakes for workers in the manufacturing industry are clear: the data predicts massive growth

in domestic auto manufacturing with the rise of EV production, projecting up to 150,000 new U.S. jobs in this industry by 2030.<sup>49</sup> This change, if not managed in ways that prioritize good job creation, equitable worker recruitment, and access to unions for workers, has the potential to decimate the (relatively) highly unionized U.S. auto industry in favor of weakening worker wages and benefits.<sup>50</sup> Conversely, with comprehensive policy development processes that center directly impacted community leadership, electrification

policies have the potential to reorient local economies in ways that improve industry standards and uplift workers.

It is clear from the data that the communities who experience the brunt of transportation-related air pollution impacts are the same communities experiencing economic injustice in cities going bankrupt from giving endless tax breaks to corporations that fail to provide fair pay or good jobs standards in return. These groups are also workers in the warehouses who are exploited on



the shop floor. Given these multi-layered injustices, comprehensive policy solutions for communities that would benefit most from EV adoption must address the “double jeopardy” of worker exploitation and environmental degradation at once.

Robust clean air and good jobs solutions are the most appropriate way to respond to the lived experiences of our most affected communities, and the taxpayer-funded transition to EVs in the warehousing and logistics industries provides the perfect moment to design comprehensive policy solutions. If current legislative trends are any indication, the shift to electric vehicles nationwide is imminent and will be stimulated heavily by public, taxpayer-funded incentives for corporations to electrify. Over the last year, both the state of Illinois and the federal government have committed sizable funds to invest in this transition, with funding pools geared towards EV manufacturers and EV purchasers, alike. Since existing and expected future government funding of the EV transition is made possible by public taxpayer dollars, these investments should be made in the public interest. This provides cause and potential avenues for tying electrification funds to raising labor standards and addressing the “double jeopardy” of economic and climate vulnerability together.

Despite the dire need for air quality solutions in communities like Will County, where residents are facing measurable public health consequences and other negative externalities of the warehousing industry, Will County’s working-class communities of color are not immediately prepared to roll out the red carpet for corporations claiming to lead on electrification. As explored more in-depth in the qualitative interview sections of this

report, communities like Joliet with bitter legacies of being let down by false promises from corporations like Amazon approach corporate solutions to social issues with skepticism. One way to build trust with communities, who will represent both workers manufacturing EVs and consumers who purchase and operate EVs, is to use the EV investment process to create good jobs with equitable hiring pipelines. To design truly just solutions to the compounding crises of economic and environmental inequities experienced by working-class communities of color, both the labor and the climate impacts must be addressed. Therefore, demands to clean up the air quality and raise standards across the entire supply chain, from EV manufacturing workers to truck drivers to warehouse workers, tend to go hand-in-hand in solutions designed by directly affected communities, as outlined in the “Recommendations” section of this report.

# RECOMMENDATIONS



Findings laid out in this report reflect what Joliet residents and workers already know: warehouses are toxic for workers and communities. Supply chain workers and fenceline community members in Illinois should be prioritized in designing comprehensive electrification policies that equitably address the number one polluting sector in the state while providing good quality jobs for workers in polluting sectors. Workers and residents of color who live closest to truck-trafficked industrial zones must be prioritized in electrification policies by the implementation of robust jobs

pipeline plans, workforce development, local hiring practices, and community partnership programs through schools and workforce centers. Electrification policies must bring Will County’s logistics supply chain and EV manufacturing industries into binding and enforceable contracts for good labor practices and environmental standards. Workers should have access to jobs with family-sustaining wages, full benefits packages, the ability to organize at the workplace, and safe, clean air. Our data collection, research process, fieldwork, and community meetings inform the following recommendations:

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## **1 We urge Illinois Governor J.B Pritzker to completely transition all Medium and Heavy-Duty fleet vehicle sales to 100% zero-emission EVs by no later than 2050.**

Governor Pritzker should join the 16 other states who have signed on to the multi-state NESCAUM Medium and Heavy-Duty Memorandum of Understanding (“MOU”) no later than 2023.

The MOU requires a state action planning process to involve stakeholders in the transition to electrification. In the Illinois action planning process, the Governor must involve directly-impacted communities and workers bearing the brunt of air pollution and economic burdens from the logistics industry.

To speed up the phase-out of diesel, Governor Pritzker must also sign onto the Advanced Clean Trucks Rule which requires truck makers to sell an increasing number of zero-emission trucks each year in place of dirty diesel and gasoline.

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## **2 We call on local, state, and federal policymakers, regulatory agencies, and EV advocates to consider the impacts of freight systems as a whole in communities at the fenceline of freight hubs that would benefit most from a transition to EV trucks.**

For working-class communities of color at the fenceline of the warehousing and logistics industry, there is no real line of separation between the health impacts felt by residents of communities polluted by this industry, and the oppression they face as workers in the low-wage, dangerous, and unstable jobs provided by this industry.

Therefore, advocates, policymakers, and regulatory agencies alike must commit to addressing the environmental, public health, and labor impacts holistically to truly ensure justice for fenceline communities.

Transitions to zero-emissions freight must happen now, giving priority to the communities most burdened by diesel and lung-damaging soot. False solutions like natural gas, which produces toxic ultrafine chemicals, must not be funded as they will continue to exacerbate existing climate crises and issues of environmental racism.

Access to taxpayer-funded EV investments for private companies across the logistics industry must be made conditional upon uplifting labor standards to create safe, family-sustaining, and stable green union jobs for workers across the supply chain, including warehouse workers, port workers, truck drivers, and EV manufacturers.

Existing federal and statewide programs for EV transition and EV readiness, including but not limited to the Illinois Climate and Equitable Jobs Act and the federal Infrastructure Investment and Jobs Act, must prioritize communities like Will County that are most impacted by freight emissions from the warehouse and logistics industries in the distribution of EV infrastructure funds.

The construction of EV infrastructure should create high-quality and union jobs in clean energy transition sectors. Illinois can look to exemplary training programs like the Electric Vehicle Infrastructure Training Program (EVITP), an EV supply equipment installation certification that includes pre-apprenticeships and registered apprenticeships, as a way to create inroads to trade careers for people of color, women, formerly incarcerated, and other historically marginalized groups.

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### **3 We demand that Will County’s warehouse industry commits to clean up the air in directly-impacted communities of color by purchasing union-made electric vehicles manufactured by high-road contractors.**

We hope that Lion Electric will soon make substantive commitments to good jobs and equity and be a leader in this area, so local businesses can buy union-made electric vehicles produced right here in Joliet.

Where possible, the largest and wealthiest corporations at the top of logistics supply chains, such as Amazon and Walmart, should shoulder the cost of EV transitions because they can afford to. Incentive money to make the transition more affordable should be prioritized for individual truck owner-operators and small trucking companies who might not otherwise be able to afford the transition. Incentive funds for individuals and small businesses should include robust training programs to support workers in the transition to EV.

In instances where incentive monies are provided to large corporations, both in the logistics and EV manufacturing fields, access to incentive funding should be conditional upon publicly-available applications that prioritize good jobs plans, including (but not limited to) fair wages, direct hire models over perma-temps, high standards for workplace health and safety, life-affirming benefits like healthcare and paid sick leave, and hiring pipelines that prioritize historically marginalized communities.

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### **4 We call on our city and county-level elected officials to plan and fund just transition programs.**

In collaboration with local colleges, the city of Joliet should apply for state and federal funding to plan and implement green jobs training programs to equip supply chain workers with skills that will prepare them for new EV-related work. The city should also use state and federal funds to create MHD EV truck purchasing programs to assist truck drivers and mechanics in the transition.

Local electeds should make investments in EVs for trucks traveling through communities most impacted by diesel-related negative health outcomes, as well as commitments to fair labor standards, mandatory for warehouse and logistics corporations applying to receive local tax abatements and incentives.

State and local incentives and subsidies supporting the electrification of freight must (A) prioritize electrification of the most polluting MHD vehicles traveling through EJ communities and (B) ensure that participating EV manufacturers and purchasers (such as logistics companies) make specific and binding commitments around job creation, job quality, and equitable recruiting and training of BIPOC and other marginalized workers who face systematic barriers to manufacturing employment. Public investments should be made in the public interest. Accordingly, application processes for public incentives to build or purchase EV trucks should create a “race to the top” effect for job quality for EV manufacturers, warehouse and port workers, and truck drivers.

Government agencies can also mitigate diesel pollution by electrifying public transit, school buses, and government-owned fleets in warehouse communities. In these cases, state and local agencies should procure electric vehicles using a best value framework that meaningfully evaluates bidders on job quality and equitable recruitment and training plans, not only on price and technical specifications. In particular, the US Employment Plan (USEP) is a proven procurement tool approved by the U.S. DOT and used by the Chicago Transit Authority and other major transit agencies to advance job quality and racial equity through public purchasing.

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**5 We urge the Environmental Protection Agency (EPA) to lower PM2.5 standards to be more consistent with existing public health data, to strengthen regulations on mobile sources of air pollution, to hold wealthy parent companies accountable for the full scope of their air pollution, and to mandate a just transition to zero-emissions freight that prioritizes the needs of workers and fenceline residents.**

To support bettering public health outcomes, current EPA PM2.5 standards should be tightened in line with existing WHO standards and recent recommendations made by the U.S. EPA’s own Clean Air Scientific Advisory Committee (CASAC.)

The EPA must set clean trucks standards that mandate a transition to zero-emissions freight now.

Opaque subcontracting models in the logistics industry have historically been used to obscure the full scope of air pollution coming from major corporations at the top of logistics supply chains. Monitoring that focuses on the aggregate polluting activity of parent companies must look beyond these subcontracting models to account for the full scope of a company’s mobile emissions in communities.

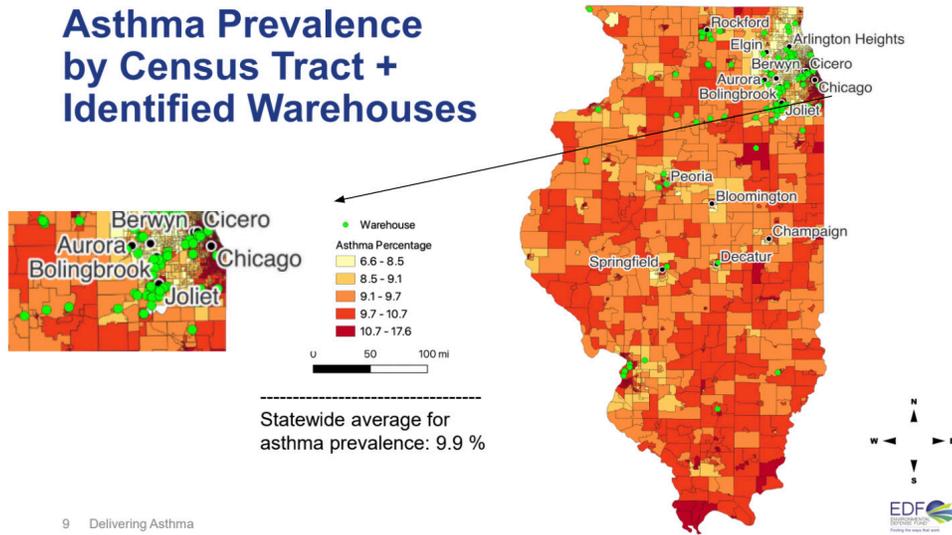
Accountability for mobile-source polluters should include hefty violation fees for companies that exceed emissions limits, which should be geared exclusively towards the wealthy parent companies and should entirely avoid having individual truck owner-operators shoulder these costs.

Because the very same opaque hiring models polluting corporations use to shield themselves from accountability for their emissions are the same structures that allow for heightened workplace injustices for warehouse workers and truck drivers, the EPA must consider freight impacts holistically. In collaboration with other agencies such as the Department of Labor, consistent with President Biden’s promised “whole-of-government approach,” the EPA must work to address both the environmental and labor impacts of freight.

# APPENDIX

A.

## Asthma Prevalence by Census Tract + Identified Warehouses



EDF's Proximity to Environmental Stressors Assessment Tool is GIS application that applies aerial apportionment to estimate the characteristics of populations living near specific facilities or other pollution sources, using the U.S. Census Bureau's American Community Survey, 5-year estimates, at the census tract level. Commonly used in peer-reviewed studies, the areal apportionment method assumes populations are evenly distributed across a given census tract, which imperfectly approximates the real spatial distribution of communities and introduces increasing uncertainty at higher resolutions and for larger tracts (e.g. rural areas). While using smaller geographies would reduce apportionment-related uncertainty, US Census block groups and blocks carry higher margins of error than tracts due to smaller sampling sizes. The tool's tract-level analysis is aimed at achieving the best trade-off to minimize each potential source of uncertainty. Additionally, the tool removes water bodies using the 2015 Census Areal Hydrography National Geodatabase before making apportionment calculations. Health data comes from the Centers for Disease Control and Prevention's Places dataset.

B.

Annual Projected Impacts in 2023: Health		
Deaths	24	# of deaths
Heart Attacks	13	# of heart attacks
Acute Bronchitis	17	# of cases
Upper Respiratory Symptoms	317	# of cases
Lower Respiratory Symptoms	222	# of cases
Emergency Room Visits, Asthma	9	# of visits
Asthma Exacerbation	339	# of cases
Lifetime Cancer Risk Per Million	293	# of cases per million people
Annual Projected Impacts in 2023: Societal & Economic		
Monetized Health Damages	268,550,872	Dollars
Restricted Activity Days	9,595	Days
Work Loss Days	1,611	Days



**WWJ Air & Truck Monitoring Sheet**

**Volunteer names:**

**Date:**

**Shift (circle one): AM / PM**

**Location (circle one): Nowell Park / Laraway & 53**

**Instructions:** Please arrive at your monitoring location at least 10 minutes early and make sure to review the materials checklist below and check in with either Madison or Yana before beginning.

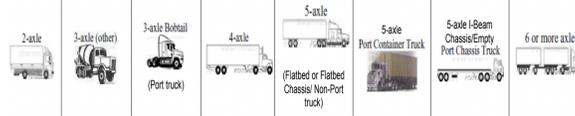
If you are approached by people who want to know more, give them the truck study flyer and let them know if they want to get involved to reach out to the contact information written on them. Talking will distract you and you may miss a truck driving by, so please try to stay focused.

**Materials checklist:**

- Pens
- Clipboard
- Chairs
- Water
- Phones- please take pictures!
- Face Mask
- Sign
- Flyers
- Umbrellas
- Air Monitor
- Truck counter

**Remember to count each truck traveling in all directions past your site by clicking your clicker. Focus on an intersection and wait to count the trucks until they pass through that intersection. At the end of your shift, please remember to write the number of trucks counted on your clicker in the boxes on the next page.**

**Here are examples of all of the medium/heavy duty classified trucks we want to count:**



**Number of MHD Diesel Trucks**

**Average AQI:**

**Highest AQI:**

**Other Notes:**



### Air Monitoring Instructions

1. Ensure that **"Bluetooth"** and **"Location"** services are activated on your Android device.
2. Open the **Air Casting** app and **log into the WWJ account**.
  - a. Username: [yana@warehouseworker.org](mailto:yana@warehouseworker.org) Password: trabajador.114
3. **Turning On Your Monitor:** Press the power button on the Airbeam, located on the bottom right of the monitor. After pressing, wait 2-5 seconds for the red indicator light. This light indicates the monitor is on and running a system check. After the system check the light will turn green.
4. **Configuring Your Monitor:** As soon as the light turns green select "Configure Airbeam2" from the main screen of the Aircasting App and press "connect" next to the device labeled "AirBeam..." (Note: Only pair with the Airbeam that matches the code on your monitor and phone.)
  - a. A "session type" window will prompt you to select between "Mobile" and "Fixed" monitoring sessions. Select "Mobile."
5. **Start Recording:** In the AirCasting app, press the bullseye on the top right of the screen. A "Session Details" window will prompt you to title your session. Name the recording with your name and activity: ex. "Tiffany's trip to work". Press "Start Session"
  - a. When the AirCasting App is in recording mode the measurement circles within the sensor boxes will change from gray to a green - red scale according to the conditions being monitored.
6. **Adding Notes:** If you are collecting data while walking, during a session press the "Add Note" icon on the top right of the screen. Use to add observational notes about your surroundings and potential pollution source (e.g. trucks, buses, construction). Notes are geotagged and added to your data.
7. **Stop Recording:** To end your recording session press the bullseye on the top right of the screen once and wait 10-20 seconds for your session to save. When the session is saved the measurement circles in the sensor box will return to gray.
8. **Rename your Session:** In the dropdown menu, go to "Sessions" and click on your latest entry. Click "Rename" and make sure to name it, specifying our location, the date, and the time. For example, if you are at Nowell Park the morning of June 16th you will name your session "NP-616AM". If you are at Larraway and 53rd the evening of July 1st, you will name your session "L53-701PM".

Air Quality Index Category	Index Value	Breakpoint (micrograms per second, 24 hour average)
<b>Good:</b> Air quality is satisfactory, and air pollution poses little or no risk with 24 hours of exposure.	0-50	0.0 - 12.0
<b>Moderate:</b> Air quality is acceptable. However, there may be a risk for some people with 24 hours of exposure, particularly those who are unusually sensitive to air pollution.	51-100	12.1 - 35.4
<b>Unhealthy for Sensitive Groups:</b> Members of sensitive groups may experience health effects with 24 hours of exposure. The general public is less likely to be affected.	101-150	35.5 - 55.4
<b>Unhealthy:</b> Some members of the general public may experience health effects with 24 hours of exposure; members of sensitive groups may experience more serious health effects.	151-200	55.5 - 150.4
<b>Very unhealthy:</b> Health alert: The risk of health effects is increased for everyone with 24 hours of exposure.	201-300	150.5 - 250.4
<b>Hazardous:</b> Health warning of emergency conditions: everyone is more likely to be affected	>300	> 250.5

**D.** Once downloaded and converted into Microsoft Excel, the four Purple Air data sets were cleaned by WWJ organizers and students. The cleaning process began by isolating the PM2.5 particles in the ATM data. ATM stands for atmosphere, meaning that the sensors that collected this data were calibrated for outside readings. A Python code was then used to clean both the Purple Air and AirBeam data based on criteria recommended from University of Chicago Illinois, and the Environmental and Law Policy Institute. Python was used to generate all data visualizations. Box plots were made of the PM2.5 data and the weekly average levels were calculated for each week of the study.

Purple air monitors have two sensors built-in to allow users to check for reliability. The two sensors operate simultaneously within one device. Once the data was downloaded, the data collected by both sensors could be checked in comparison to one another. Using three standard deviations above the mean, the two data sets from each Purple Air sensor were analyzed for spikes in the readings. If the same spikes were seen in both sensors, it was an indication that the data is likely accurate. If the same spikes or trends were not seen in both sensors, that value was considered an outlier and eliminated from the data analysis. The box plots and averages were then recalculated without the outliers and the data was color coded according to the risk the levels presented. The AirBeam monitors only had one sensor each, so there was one set of data for each time the air quality was measured. The data was analyzed by calculating the averages and standard deviation of PM2.5 concentrations during each time data collection time. The results were also displayed in box plots and bar graphs. The graphs were also color coded according to the EPA guidelines for air quality concentrations. The number of trucks counted at each of these locations was also compared with the data.

We noticed that although both the Purple Air and AirBeam monitors recorded PM2.5 by micrograms per second, the ranges of AQI were different. In 2012 the EPA released a revision to the Air Quality Index (AQI) that is exemplified in the AQI table provided in the “Data Analysis” section. We concluded that the AirBeams were using the revised AQI while the Purple Air monitors were using the thresholds before the 2012 revision. By tweaking the Python code for the Purple Air data sets, we corrected the AQI breakpoints to align with EPA’S 2012 revision and the AirBeam thresholds.

The air quality monitors used by the EPA and the Purple Air sensors use different technologies for measuring the concentration of PM2.5 in the air. Studies have shown that the Purple Air sensors report higher concentrations of PM2.5 compared to the EPA monitors. Since the EPA guidelines are based on their monitoring system, it is important to apply a correction to the Purple Air data so that the Purple Air measurements can be compared to EPA air quality standards. Though the correction was initially developed to account for particulate matter from wildfires in the Western United States, the most recent corrections were developed using data from during smoke and non-smoke events across the United States, including from a test site in Illinois, and are intended to be applied to all Purple Air data.<sup>51</sup> The corrections incorporate both the Purple Air PM2.5 measurements and the relative humidity. While the differences in measurement methods and monitoring technology account for much of the correction, studies show that higher humidity increases the PM2.5 readings so this must be accounted for as well. In order to apply the corrections, which incorporate relative humidity, we ensured that the primary and secondary sensors both recorded data within a 2 min window of each other and checked that the humidity, which is only measured by the primary sensor, was recorded and gave a number between 0 and 100%. (An error in the humidity sensor can give a number outside that range.)<sup>52</sup>

The AirBeam data does not have the EPA air quality index corrections used on the Purple Air data applied since the monitors record PM2.5 concentrations on a shorter time frame, as opposed to the Purple Air monitors which captured data 24/7 for the entirety of our 8-week study. Shorter data collection windows mean that AirBeam data falls into specific air quality ranges, but we can speculate that it is likely they would produce similar results to the Purple Air graphs if they were monitoring over 24-hour periods.

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