

Innovative technologies and nonprofit networking have become vital tools for increasing community awareness and participation in efforts to address the Pittsburgh region's long-standing air quality problems. By Jeffery Fraser

FIGHTING FOR

AIR







PLUMEPGH

Plume Pittsburgh (PlumePGH), produced by Carnegie Mellon University's CREATE Lab, is an online model of industrial emissions data in real time and allows viewers to see that air pollution has effects beyond the immediate surroundings of an industrial plant.

Pollution has the potential to spread throughout the entire region as weather and wind direction change.

U. S. Steel's Clairton Coke Works, located about 15 miles south of Pittsburgh, is the largest coke-making facility in North America.



It's a warm late-summer morning. Emissions from the U. S. Steel coke plant at Clairton in Allegheny County's Monongahela River Valley hang low in the atmosphere. Dense with fine particulates, sulfur dioxide and other pollutants, they snake northward, mixing with emissions from mills in Dravosburg and Braddock.

The thickening plume rides the breeze through Pittsburgh city neighborhoods and the boroughs and townships beyond: Uptown, Hill District, Oakland, North Side, Homewood, McKees Rocks, Ross, Forest Hills, Penn Hills, Monroeville and Plum among them.

Shortly after midnight, residents begin reporting foul odors in and around the plume's path. One or two, at first. Then, dozens more.

This isn't an extraordinary pollution event. Such plumes are common in Allegheny County, particularly when temperature inversions prevent pollution from thinning at higher altitudes, which can occur more than 150 days in a year. What is extraordinary is the level of surveillance that betrays the presence of air pollution in the region.

It's all there to see in living color at plumepgh.org — and you don't need a degree in any of the sciences to grasp what is happening.

The Plume Pittsburgh (PlumePGH) online model, developed by the Carnegie Mellon University CREATE Lab, draws from industrial emissions data; odor reports from the crowdsourcing app Smell Pittsburgh (SmellPGH); and real-time weather data to map the travels of pollution from major industrial sources by the hour, minute and second, every day.

One thing PlumePGH makes clear is this: What happens in the industrial Mon Valley doesn't stay in the Mon Valley.

"Many people were in deep denial of that," said Philip Johnson, senior program director for Environment & Health at The Heinz Endowments. "The idea that what happens in the Mon Valley stays there simply isn't true. You can't argue that when confronted with sensors, meteorological data and human smell."

PlumePGH is one of several novel technologies that have been developed with

support from the Endowments over the past 10 years. It's part of a strategy to bring research and innovation to bear on improving the air quality in southwestern Pennsylvania, where the legacy of pollution dates to the advent of steel and other heavy industry along its rivers more than a century ago.

The public has been slow to grasp that legacy, allowing misconceptions to linger. Among them: The absence of soot that had hung heavily over the region when its steel mills roared is a clear sign the air has been restored to health, or that because it's better, the health risks are trivial. Such notions ignore levels of less-visible pollutions, such as fine particulates, that are among the highest in America and impose greater health risks than are found in other regions.

Southwestern Pennsylvania residents felt air quality in the region wasn't too bad back in 2011, when the Endowments surveyed them. Only 15 percent said "a lot of work" was needed to fix the problem. And more than half were unaware that the air quality of the region was among the worst in the United States.

Such misconceptions were confirmed by other surveys. More than 52 percent of southwestern Pennsylvania residents believed the region's air quality was "not a problem at all" in a 2012 survey by Pittsburgh Today and the University of Pittsburgh University Center for Social and Urban Research.

Dr. Johnson recalled what former Houston, Texas, Mayor Bill White observed about Pittsburgh when he visited in 2011. Mr. White had made air quality a priority of his administration.

"He said to me, 'You know what the big difference between Houston and Pittsburgh is? In Houston, we admit we have an air pollution problem and we know it's killing us. In Pittsburgh, you are in denial and refuse to believe it.'"

Supporting science that sheds light on the region's air quality issues and the public health risks they pose was seen as a way to erode the misperceptions that persisted. In

2011, the Breathe Project was launched as a clearinghouse of scientific evidence related to pollution and health.

Among the first reports were regional risk assessments done by University of Pittsburgh public health researchers that helped define the air pollution in the region and the risks to people who regularly breathe it. Today, the Breathe Project database holds nearly 250 reports and scientific studies on air pollution. It also offers tools, such as the Breathe Meter, which compares air quality in Pittsburgh to other regions. Spoiler alert: 88.5 percent of U.S. metro regions have cleaner air.

The research includes some of the first studies to define the relationship between local air quality and health problems that many residents have quietly endured for years.

Amanda Jones, 19, grew up in the Larimer neighborhood of Pittsburgh. Asthma was her constant companion, as it was for the five other members of her family.

“If it was a bad air quality day, I’d still go to school,” she said. “If I didn’t feel good, I wouldn’t go out for recess and just sit in the classroom and know it wouldn’t be a good day.

“It wasn’t just my family. There was a lot of kids who had asthma at school. We all had inhalers. When you left the house, it was, ‘Make sure you have your inhaler.’ When you were in school, it was, ‘Whose inhaler is this?’ We had to write our initials on them. In that kind of environment, it becomes the norm.”

Dr. Deborah Gentile documented that what Ms. Jones experienced is not uncommon in the region’s schools, particularly those exposed to industrial emissions. In a study supported by the Endowments, Dr. Gentile found that 22.5 percent of the more than 1,200 schoolchildren in the study had asthma — far higher than the 8.5 percent national rate reported by the Centers for Disease Control and Prevention.

Some 70 percent of the local children with asthma lived in places near industrial plants, where levels of fine particulates in the air exceed the annual limit of 5 micrograms per cubic meter recently set by the World Health Organization.

“That should be an eye-opener,” said Dr. Gentile, medical director of Community

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Community Partners
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Partners in Asthma Care. “It is astounding that children who live near these sources of pollution are exposed to such high levels. It obviously has translated into disease.

“Kids spend a lot of time outdoors playing. Their lung surface area is much larger than an adult’s, so more of their lung surface is exposed to pollution. Kids, as part of development, breathe at a faster rate than adults, and that exposes them to more air pollution.”

The findings are among the information that continues to be shared in local asthma summits. The idea of the summits, Dr. Gentile said, is to raise awareness among health care providers of the region’s high rate of pediatric asthma and that air pollution can be a trigger.

“In medicine, we traditionally think of respiratory infection, tobacco smoke and allergens as triggers,” she explained. “We know air pollution can trigger asthma, but it’s not one of those things physicians always consider when they’re taking a patient’s history.”

The summits are examples of the broadening of the Endowments’ air quality strategy. As the research began to deepen the understanding of the region’s air quality issues, sharing the science in ways that inform public discourse and support community advocates for change gained importance.

The Breathe Project focused on building networks that afforded local citizens a voice in improving their air. Within a few years, more than 50 organizations ranging from grassroots citizens groups to university researchers and health care providers were on board.

The Endowments didn’t have to look far for someone to develop novel tools to support them. Researchers at the CREATE Lab, who had already come up with low-cost portable home air quality monitors, were asked to develop high-resolution cameras that could capture real-time industrial emissions.

A group of residents in Allegheny County’s northern boroughs were eager to give the new camera a try. They lived across the Ohio River from the Shenango coke plant on Neville Island. And they had been urging the county Health Department and company to curb the emissions wafting into their neighborhoods with little success. One resident allowed researchers to set up a camera in her attic to get a direct view of the coke works.

The camera not only captured smokestack emissions but also other fugitive emissions escaping throughout the plant.

“The narrative had been, ‘Yes, you’re smelling something, but it isn’t coming from our facility. It is coming from somewhere else,’” said Randy Sargent, director of visualization at CREATE Lab. “From that vantage point, we were able to capture these super-high-resolution videos that ended up changing the narrative.”

Citizens presented the video evidence at a November 2015 town hall meeting in Ben Avon, a suburban community north of Pittsburgh, that was attended by David Arnold, then the acting regional director of the U.S. Environmental Protection Agency Air Protection Division.

“What I see in the video is totally unacceptable,” he told the audience. One month later, the plant’s Michigan-based owner announced it would close the coke works

INVOLVING THE PUBLIC

after local and federal regulators reopened an investigation of pollution violations that had already led to \$1.75 million in fines.

CREATE Lab researchers were only beginning to arm a growing army of citizen scientists with new tools. They developed the SmellPGH app, enabling residents to report odors in real time, widening the air quality monitoring network beyond what county and state agencies deploy.

PlumePGH maps those crowd-sourced reports alongside estimates of emissions from four major industrial polluters and plots their course using actual meteorological data. And developers are working on making it possible for PlumePGH to predict the course of pollution days ahead of time, Mr. Sargent said.

“They are powerful, truth-telling tools,” said Andrew McElwaine, vice president of Sustainability at the Endowments. “You can’t deny what is captured on film, what is tracked in real time with PlumePGH and the crowd-sourced data.

“The ability to say ‘It’s sometimes bad here but you should have seen it in 1950’ becomes irrelevant with the tools we have showing how people and their health are being impacted day after day, year after year.”

The tech tools are gaining popularity. The SmellPGH app alone has collected more than 54,000 bad air reports, some 19,000 of which were reported this year, said Ana Hoffman, CREATE Lab’s director of air quality engagement.

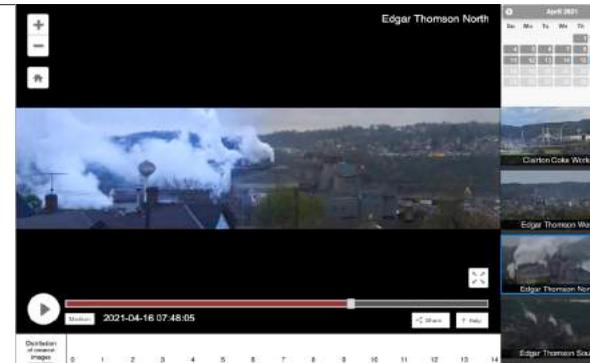
And as southwestern Pennsylvanians become more engaged in advocating for cleaner air, they are changing the dynamic in the battle against pollution, said Matthew Mehalik, executive director of the Breathe Project.

“What the Breathe network, the campaigns of community members, and the data and the health studies are pointing to is that the next generation of leadership is going to have to address air quality as an important regional concern,” Mr. Mehalik said. “And polluters are increasingly less able to use the shadows of uncertainty and misperceptions as a way to forestall change.” **h**

Innovative technology, especially apps and websites that are accessible and simple for many people to use, has made it easier to educate the public about the Pittsburgh region’s air quality and motivate individuals to seek ways they can help address pollution problems.

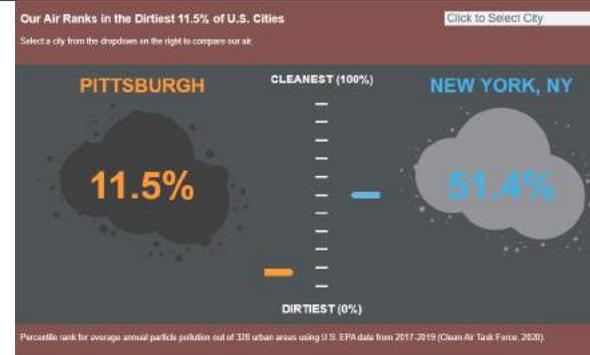
BREATHE CAMS

Breathe Cams are high-resolution, zoomable, 24-hour live camera feeds of Pittsburgh’s skyline, the Mon Valley and the Ohio River Valley that enable viewers to see the amount of pollution in the air and discover more about what they are breathing. These images can be found on the Breathe Project website: www.breatheproject.org



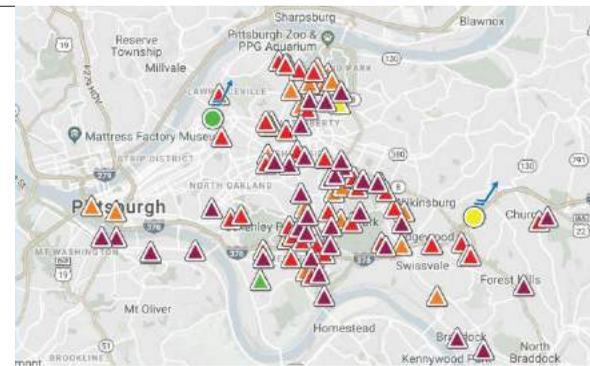
BREATHE METER

Breathe Meter compares Pittsburgh’s percentile rank for average annual particle pollution against 327 other urban areas using U.S. EPA data from 2017-19. The Breathe Meter is housed on the Breathe Project website: www.breatheproject.org



SMELLPGH

SmellPGH is an app developed by Carnegie Mellon University’s CREATE Lab that crowdsources smell reports so that pollutants can be tracked as they travel through the air across the Pittsburgh region. The Allegheny County Health Department receives all SmellPGH odor complaints as they are submitted and can then use this information to better monitor the region’s air quality and identify pollution sources.



FRACTRACKER

FracTracker Alliance provides information and resources on oil and gas drilling and their related health and environmental problems state-by-state, across the U.S., and in some countries outside of the U.S. www.fractracker.org

