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April, 2009

# Justice in the Air: Tracking Toxic Pollution from America's Industries and Companies to our States, Cities and Neighborhoods

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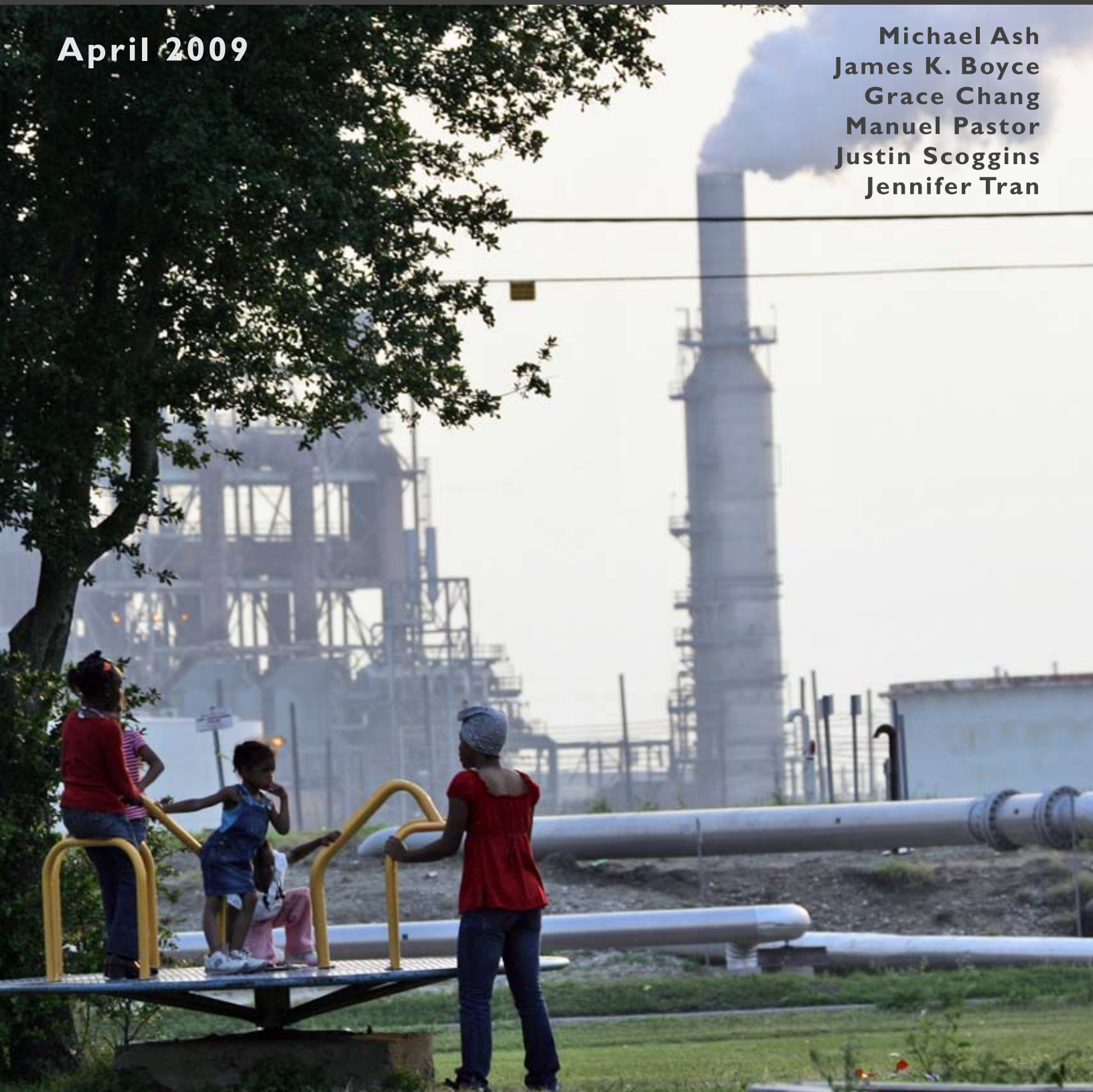
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# JUSTICE IN THE AIR

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Companies to our States, Cities, and Neighborhoods

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## FOREWORD

In recent years, Americans have become increasingly concerned about our environment. With climate change threatening the planet, dirty air triggering asthma, and industrial pollutants causing cancer, the nation is more motivated than ever before to take a hard look at the problems we face and seek new approaches that can better secure the future of the planet and the health of our communities.

One of the first steps in that process is gathering the information that can help frame the challenge and steer us to positive solutions. This report, one of the first efforts based on a new database on industrially-generated toxic air, attempts to do just that. Along the way, we examine not only the level of pollution but also who is being polluted. As with so many other environmental hazards, it turns out that the problems are disproportionately borne by low-income communities of color.

One unique aspect of this work is that we track the pollution not just to the smokestacks but to the companies that own them. Many firms are aware of their impacts on communities and the environment, and many have adopted strategies for becoming better corporate citizens. This report aims to contribute to these efforts by presenting a new measure of performance: whether companies are having a particularly high and disparate impact on disadvantaged communities.

This work has been the product of many hands – not that it made the work that much lighter – and even more eyes. For having the faith to fund the larger project from which this stems, we thank Michelle De Pass and the Ford Foundation. For helping us think through data issues inherent in our calculations, we gratefully acknowledge our colleagues Nick Bouwes, Paul Mohai, Rachel Morello-Frosch, Rich Puchalsky, and Jim Sadd. For working with us to make our message more, well, understandable, we thank Michelle Mulkey and Fenton Communications. And for reviewing our early research and making suggestions for change, we thank our colleagues in the environmental justice movement who work hard every day to secure healthy neighborhoods for all Americans.

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# INTRODUCTION

## Know Your Air

On the long road to securing the right of every American to a clean and safe environment, an historic milestone came when Congress passed the Emergency Planning and Community Right-to-Know Act in 1986. This law requires industrial facilities across the United States to disclose information on their annual releases of toxic chemicals into our air, water, and lands.

The premise behind the law is simple: the public has the right to know what pollutants are in our environment and who put them there.

The resulting data, available from the U.S. Environmental Protection Agency (EPA) in something called the Toxics Release Inventory (TRI), are not always easily accessible or readily usable. You can track pollution to the plant that caused it but not always to the company that is responsible. You can see the pounds of individual pollutants released at a plant but it's hard to cumulate the overall health impact of the plant's multiple pollutants. And even if you can gauge the overall effect of a single facility, there is no easy way to determine what this means for a neighborhood burdened with pollution from many such sources.

This report tackles these issues by using a new dataset built upon the TRI dataset to measure the extent to which toxic pollution released by industry disproportionately contaminates the air in neighborhoods where people of color and low-income families live. Most significantly, we present a scorecard for companies that measures

the extent to which their pollution is concentrated in these neighborhoods – the first time such a measure has been calculated and made available to the public.

This investigation is entirely consistent with the aims of the 1986 Right-to-Know legislation. The law's proponents expected that better access to information would not only increase public awareness, but also increase public demand for actions by firms and government officials to curb pollution. Information, they believed, is power. The right to know was intended to be a means to the greater goal of securing our right to clean air and clean water.

### Chemical Disaster In Bhopal

The trigger for the passage of the Emergency Planning and Community Right-to-Know Act of 1986 was the public demand for information on toxic hazards following a massive industrial disaster on the other side of the world. Early one morning in December 1984, a cloud of methyl isocyanate escaped from an insecticide-manufacturing plant in the city of Bhopal, India. The plant was owned by an American chemical company, Union Carbide. In the poor neighborhoods near the factory, the accidental release killed at least 2,000 people and injured many thousands more.

The Bhopal disaster sparked an international outcry and raised concerns in the United States about the risks to the public here at home. These concerns intensified in the following year when the U.S. Environmental Protection Agency disclosed that there had been more than two dozen leaks of the very same chemical over the past five years at a Union Carbide plant near Charleston, West Virginia.

The mere fact that companies are now compelled to publicly disclose this information has had a striking impact on their behavior (Konar and Cohen 1997). Within the first ten years, total emissions of the chemicals listed in the TRI had fallen by 44% (Tietenberg 1998). For the most part these reductions happened without new regulations: when companies knew that the public knew about their releases of pollutants, they began to clean up their acts.

Young people at a playground in the industrial area of Louisiana known as “Cancer Alley.”



In the 1990s the EPA took another big step to expand public information about toxic pollution. The agency launched the Risk-Screening Environmental Indicators (RSEI) project to assess the human health risks resulting from toxic chemical emissions at industrial sites. Building on the TRI data, the EPA combined three variables to assess the human health risks posed by toxic releases:

- **fate and transport**, or how the chemical spreads from the point of release to the surrounding area;

- **toxicity**, or how dangerous the chemical is on a per-pound basis; and
- **population**, or how many people live in the affected areas.

This report uses the information generated by the EPA’s RSEI project to develop a measure of corporate “environmental justice” performance based on releases of toxic air pollutants. Along the way, we explain what the data mean, which states and metropolitan areas are most affected, and what companies and communities can do to improve their performance and the environment.



## AMERICA'S TOXIC AIR

### Mapping Industrial Air Pollution

The building block for our analysis is the EPA's Risk-Screening Environmental Indicators (RSEI) project. Information about RSEI is available on a CD-ROM disc that can be obtained free of charge from the EPA (see "How to Order" at the end of the technical appendix in this report). The CD-ROM provides facility-by-facility data on toxic releases, including the facility's "RSEI score," a measure of the total human health hazard, and contributions of individual chemicals to the facility's total score.

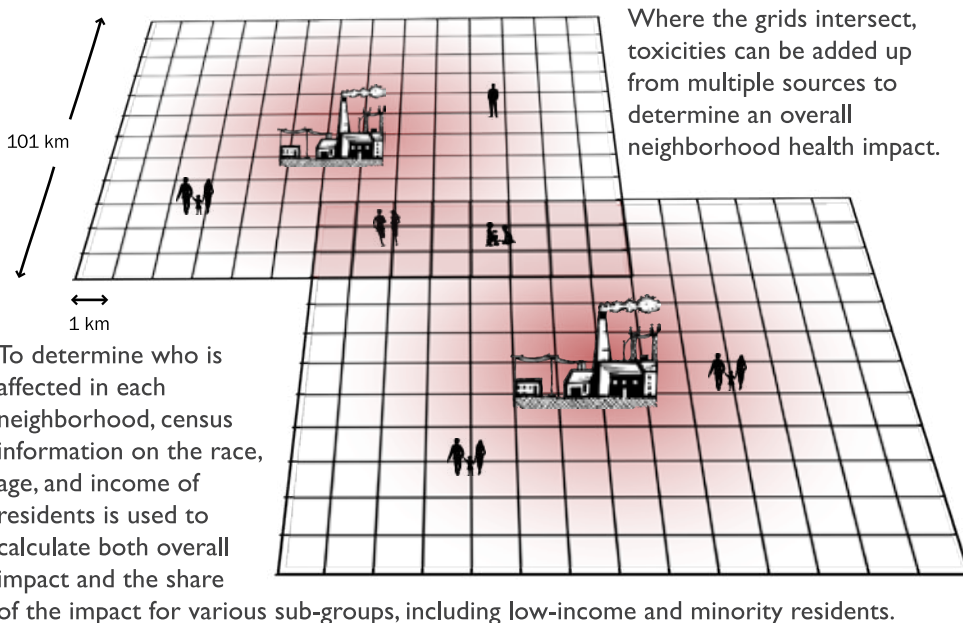
The EPA calculates the total chronic health risks (cancer and non-cancer) from toxic air pollution using toxicity weights and inhalation factors for the underlying chemicals reported by every facility in the Toxics Release Inventory (TRI). It then uses a fate-and-transport model that estimates

exposure levels in each of more than 10,000 one-kilometer-square "grid cells" around the facility. In the information on the CD-ROM, all of these impacts are added up for each facility. Information is not provided for individual grid cells, as such a massive amount of data requires much greater storage space.

The geographic microdata for individual grid cells have been made available to researchers, however. Using these, we can measure the cumulative impacts on any given community from chemical releases at multiple facilities. And we can document the extent to which differences in community exposures to toxic air pollutants are correlated with differences in race, ethnicity, and economic status (see Figure 1 for a "user-friendly" explanation of the data).

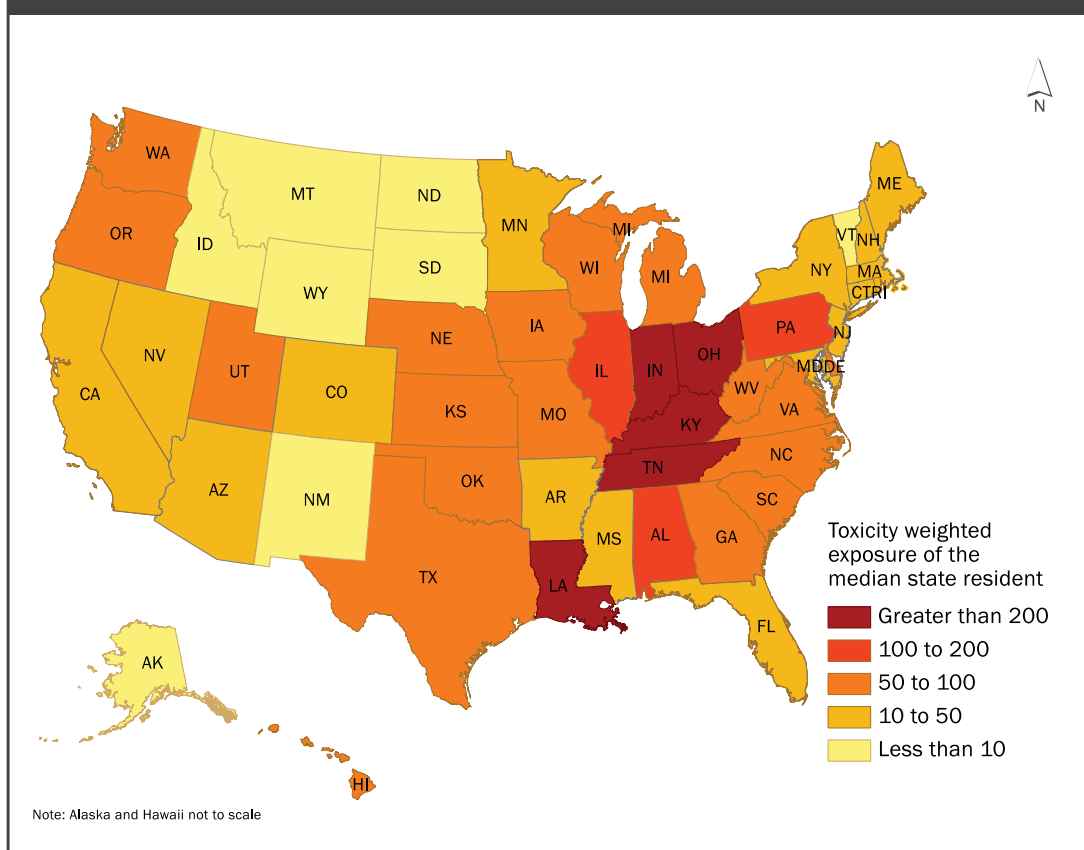
**Figure 1: The EPA's Risk-Screening Environmental Indicators (RSEI)**

RSEI takes the toxic air release from each industrial source and uses wind and other information to determine where the releases go within a grid around each facility. RSEI attributes higher health impacts to grid cells exposed to higher-toxicity chemicals.



One broad overall measure that comes from these data is the toxicity-weighted exposure for residents, which can be calculated by adding up all the toxic pollutants from all the industrial sources in the EPA's database that accumulate in any given neighborhood. We can then take those neighborhoods, determine how many people live in them, and calculate the toxic air pollution burden for the people in a city, metropolitan area, or state. And because we have the data at the neighborhood level, we can then determine if there are higher or lower exposures in minority or low-income neighborhoods within these larger areas, calculating the share of the pollution burden borne by different population sub-groups.

**Map 1: Median Exposure to Industrial Air Toxics by State**



Map 1 begins the analysis by showing the state-by-state levels of exposure to toxic air pollution from industrial facilities, measured here as the toxicity-weighted exposure of the median resident. The states with the darkest shade – such as Ohio, Louisiana, and Tennessee – have the highest levels of exposure. Those with the lightest shade – such as Vermont and Wyoming – have the lowest levels. The variations reflect not only where industrial facilities are located, but also how strictly they are regulated, what pollutants they emit, and how these emissions are dispersed by prevailing wind patterns.

Industrial facilities are not the only sources of air pollution. In particular, mobile sources such as automobiles and trucks account for much of the nation's air pollution. Small-scale businesses such as dry cleaners and auto body shops are exempt from TRI reporting requirements, and so their emissions are not captured in the RSEI database. The chemicals

in the TRI are toxic agents but do not include some bulk pollutants that also pose significant health and environmental risks, including sulfur dioxide, nitrogen oxides, ozone, carbon monoxide, particulate matter, and carbon dioxide. A complete picture of air pollution and the attendant health risks would include these other sources and chemicals, too.

Here we focus on industrial air toxics for four reasons. First, in some heavily impacted communities, industrial releases account for the biggest share of air pollution exposure. Second, the RSEI data on exposure permit an exceptionally fine-grained mapping of the impacts of different industrial sectors on different communities. Third, the pollutants analyzed generally have significant local effects. Fourth, with a bit of detective work on the ownership of facilities, the responsibility for this pollution can be traced directly to specific corporations.

## TRACKING PEOPLE

### Who Breathes America's Dirtiest Air?

Air pollution is unevenly distributed within states, as well as between them. A growing body of research has demonstrated that people of color and low-income communities often face the greatest environmental hazards (see, for example, Bullard 2000 and Pastor 2007).

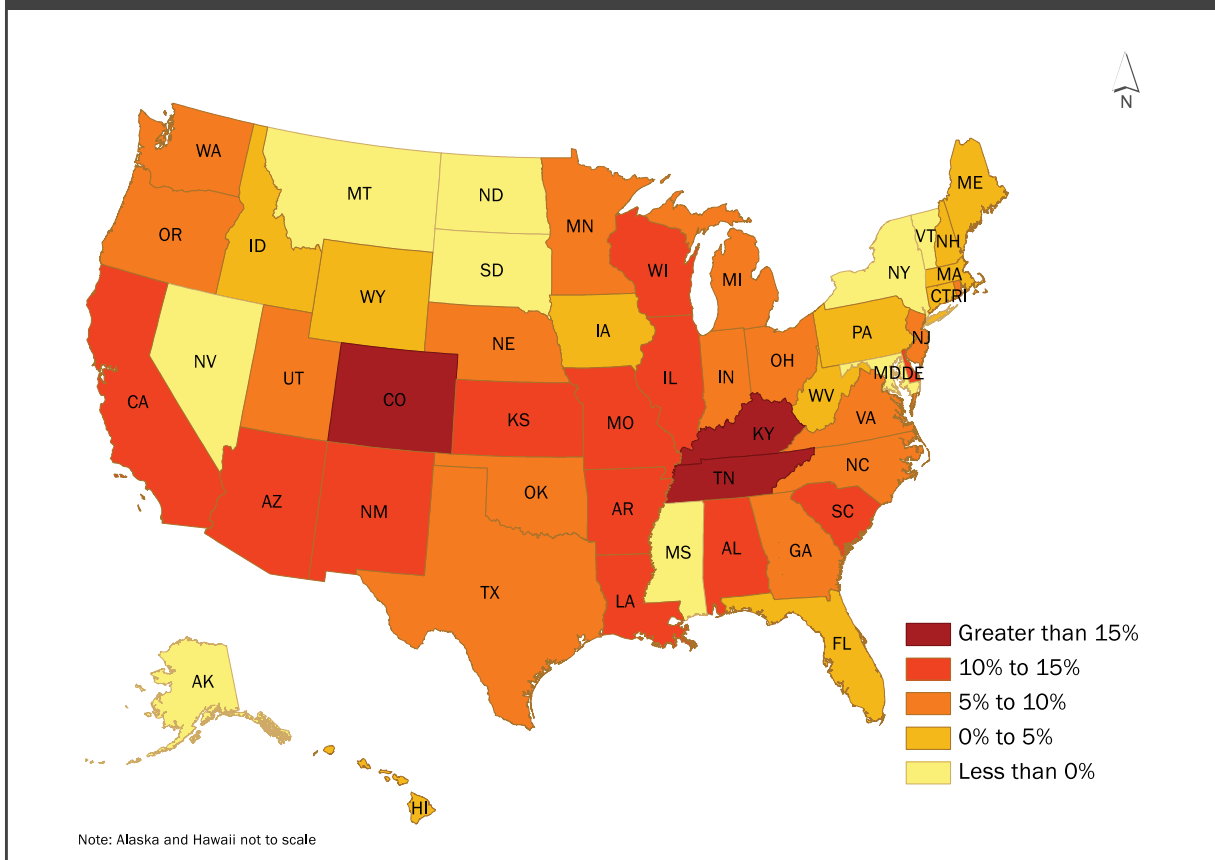
Toxic air pollution from industrial facilities is a case in point. Using the RSEI data, EPA researchers have found that nationwide, the most polluted locations have significantly higher-than-average percentages of blacks, Latinos, and Asian-American residents (Bouwes et al. 2003).

This reflects differences within metropolitan areas as well as between them. Nationwide, blacks live disproportionately in cities with higher industrial

**Mother and daughter from San Pedro, a highly polluted neighborhood in Los Angeles.**



**Map 2: The Difference Between the Minority Share of Health Risk from Industrial Air Toxics and The Minority Share of the Population by State**



air pollution, while Latinos tend to live in less heavily impacted cities. Yet within any given metropolitan area, Latinos as well as blacks tend to live on the “wrong side of the environmental tracks” (Ash and Fetter 2004).

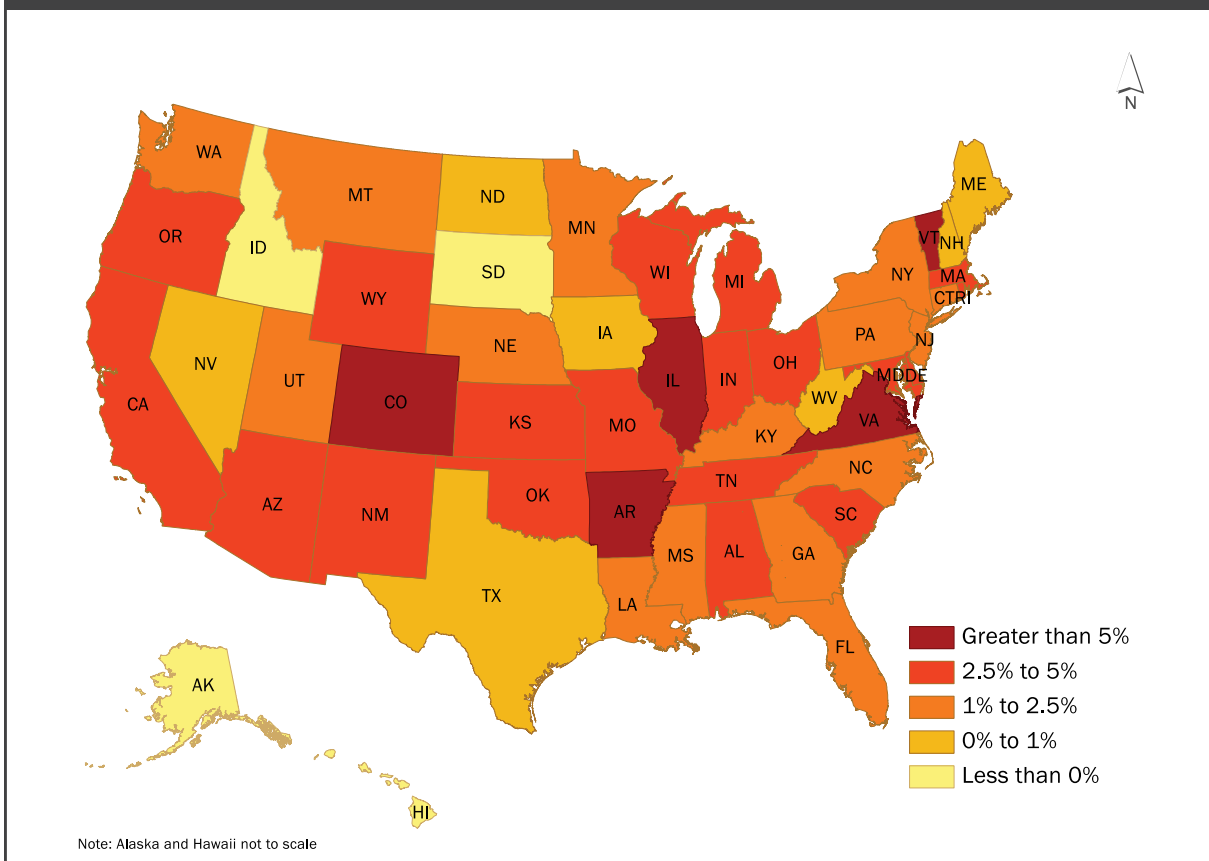
The extent of racial, ethnic, and class-related disparities in environmental quality varies across the country. Maps 2 and 3 depict these differences on a state-by-state basis.

Map 2 shows the difference between the share of people of color in the total human health risk from industrial air toxics and their share in the state’s population. The most dramatic racial disparity is in Tennessee, where the share of people of color in the health risk is 43% compared to their share in the population of 21% – a

difference of 22 percentage points. Interestingly, some states – like California and Colorado – do not show up in Map 1 as having the highest level of toxic air releases, but they do show up as having a very uneven distribution of the resultant risk.

Map 3 shows the same differences for low-income people. The most dramatic disparity is in Illinois, where the share of low-income people in the health risk is 18% whereas their share in the state’s population is 11% – a difference of 7 percentage points. Again, some states that are not among those with the highest overall risk are, however, at the top of those places where the resulting health burden is borne most heavily by lower-income families.

**Map 3: The Difference Between the Low-Income Share of Health Risk from Industrial Air Toxics and the Low-Income Share of the Population by State**



In Tables 1 and 2, we take a more fine-grained look at geographical variations in the extent of these disparities. In both, we consider America's metropolitan areas, focusing on those that have an above-average level of toxicity-weighted resident exposure and that also have a big enough population to make it into the list of the country's 100 largest metropolitan communities.

Table 1 lists the metropolitan areas with the largest discrepancies between the share of minorities in the health risk from industrial air toxics and their share in the population. Topping the list is Birmingham, Alabama, where minorities account for 65% of the health risk as compared to 34% of the population – a discrepancy of 31 percentage points. Baton Rouge, Louisiana, is not far behind, with Memphis, Chicago, Harrisburg, and several others following in a tighter pack.

Table 2 presents comparable discrepancies for low-income households. Birmingham tops the list again, with low-income people accounting for 24% of the health risk, compared to 13% of the population.

**Table 1: Disproportionate Impacts on Minorities  
Top Ten Metropolitan Areas**

Metropolitan area	Minority share of toxic score	Minority share of population	Minority discrepancy
Birmingham, AL MSA	64.7	33.5	31.1
Baton Rouge, LA MSA	63.6	36.1	27.5
Memphis, TN--AR--MS MSA	70.6	48.1	22.5
Chicago, IL PMSA	61.2	42.0	19.2
Harrisburg--Lebanon--Carlisle, PA MSA	32.2	13.5	18.7
Louisville, KY--IN MSA	36.5	18.0	18.5
Gary, IN PMSA	50.0	32.1	17.9
San Diego, CA MSA	62.7	45.1	17.6
Milwaukee--Waukesha, WI PMSA	43.0	25.5	17.5
Tacoma, WA PMSA	41.1	24.0	17.1

Not surprisingly, there is some overlap with Table 1: five metropolitan areas appear on both lists. The fact that the overlap is not complete shows, however, that income as well as race and ethnicity is an important locus of environmental disparity.

Just as income matters independently of race, race matters independently of income. It is not the case that people of color simply happen to be poorer or live in industrial neighborhoods with lower property values. Multivariate studies – studies that test statistically for effects of race and ethnicity while holding income and other factors constant – have demonstrated that significant racial disparities in exposure persist across all bands of family income (see, for example, Bouwes et al. 2003, Pastor et al. 2005, Rinquist 2005 and Mohai and Saha 2006).

If the first step to recovery is admitting that you have a problem, America must acknowledge that clean and safe air – which would seem to be a birthright of every person – is not currently an equal opportunity affair.

**Table 2: Disproportionate Impacts on Low-Income People  
Top Ten Metropolitan Areas**

Metropolitan area	Low-income share of toxic score	Low-income share of population	Low-income discrepancy
Birmingham, AL MSA	23.8	13.1	10.7
Baton Rouge, LA MSA	26.1	16.2	9.9
Youngstown--Warren, OH MSA	21.3	11.5	9.8
Charleston--North Charleston, SC MSA	23.0	14.0	9.0
Tacoma, WA PMSA	19.4	10.5	8.9
Gary, IN PMSA	19.0	10.8	8.2
Milwaukee--Waukesha, WI PMSA	18.3	10.6	7.7
Knoxville, TN MSA	19.6	12.0	7.6
Columbus, OH MSA	17.1	10.1	7.0
Detroit, MI PMSA	17.7	10.7	7.0



## TRACKING POLLUTERS

### Who Owns the Smokestacks?

So where does toxic air pollution come from? Who owns the facilities – the refineries, power plants, factories, and other industrial sources – that put these pollutants into our air?

The RSEI database provides information on emissions of toxic air pollutants from more than 16,000 industrial facilities nationwide. Combining this with information on the corporate ownership of these facilities, researchers at the Political Economy Research Institute (PERI) of the University of Massachusetts, Amherst, have produced “The Toxic 100,” a ranking of the top industrial air polluters in the United States.

The latest edition of the Toxic 100 uses 2005 data (the most recent available when we were conducting this research) to identify the top polluters among the nation’s largest publicly traded companies – those that appear on the Fortune 500, Fortune Global 500, S&P 500, or Forbes Global 2000 lists. These are not only the biggest firms in the country in terms of annual revenue, but also may be the most responsive to demands from shareholders and the public alike for improved performance in safeguarding public health.

The top ten firms in this ranking of toxic pollution are listed in Figure 2. The ranking is based on firm-level toxic scores, which represent total human health impacts as estimated by the EPA’s RSEI project, taking into account the pounds of chemicals released, their toxicity, the fate and transport of these releases in the environment, and the number of people exposed. The Toxic 100 website (<http://www.peri.umass.edu/toxic100/>) gives details on the chemicals and facilities that account for each company’s total toxic score.

To derive the firm-level scores, we make use of the EPA’s “RSEI scores” for each industrial facility that reports emissions in the Toxics Release Inventory. The EPA’s RSEI scores are meant to simply convey relative rankings: a score of 100 means that the human health impacts are 10 times greater than a score of 10. Here we divide the firm’s RSEI score, summed over

**Oil refinery abutting a neighborhood in Willmington, California.**



all its facilities, by the total RSEI score for all firms nationwide, to get a “toxic score” that essentially conveys the firm’s relative share of the total impact of industrial toxic air pollution in the country. To make matters simple, we normalize (or set) the total national score at 10,000 – thus, the top corporate toxic score of 196 means that the firm accounts for 1.96%, or almost 2%, of the national total of all the health impacts from all the air toxics emitted by all the firms and facilities in the entire RSEI database.

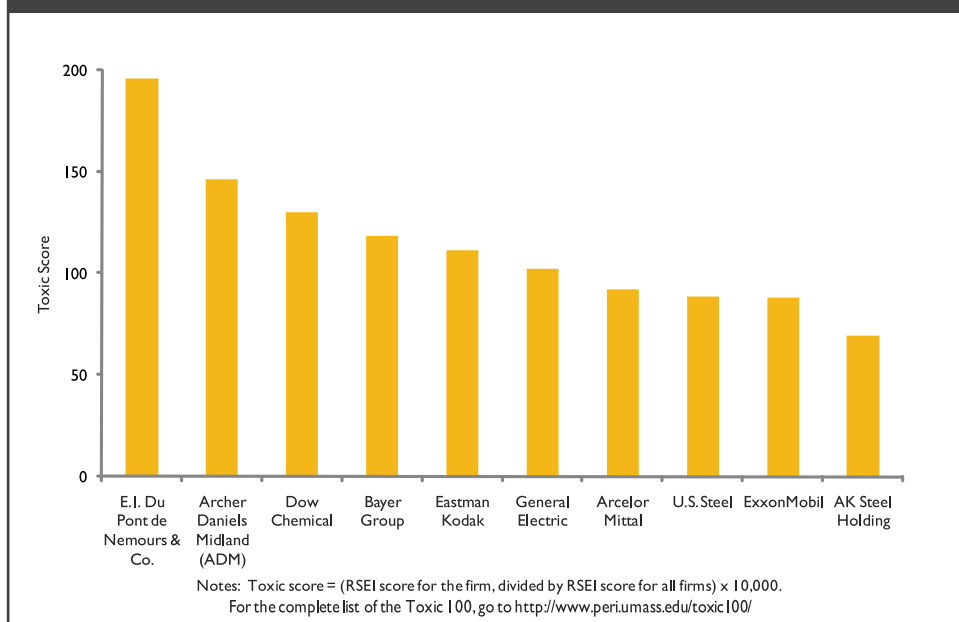
Topping the list is DuPont, the Delaware-based chemical company. The biggest single item in its score comes from chloroprene releases at a DuPont-owned facility in Louisville, Kentucky. The National Institute for Occupational Safety and Health (NIOSH) reports that chloroprene, a chemical used in the production of synthetic rubber, can damage the eyes,

skin, respiratory system, and reproductive system. This plant stopped operations in early 2008 but the most recent RSEI data we have is from 2005.

Second on the list is Archer Daniels Midland (ADM), the Illinois-based agricultural processor. The biggest single contributor to its score comes from acrolein releases at its facility in Peoria, Illinois. According to the NIOSH, acrolein – which was used as a chemical weapon during World War I – can damage the heart, eyes, skin, and respiratory system.

Rounding out the top ten in the Toxic 100 list are Dow Chemical, Bayer Group, Eastman Kodak, General Electric, Arcelor Mittal, U.S. Steel, ExxonMobil, and AK Steel Holding. The EPA data indicate that between them, these 10 companies alone accounted for over

**Figure 2: Top Ten Corporate Air Polluters in the Toxic 100**



11% of the total human health risks from industrial air toxics in the United States in 2005.

The same data can be used to rank industrial sectors on the basis of their toxic air pollution. Table 3 lists the top ten sectors nationwide (again based on the most recent available data). Topping the list are two sectors in the primary metals industry: steel works, blast furnaces, and rolling and finishing mills are first, followed by iron and steel foundries.

Taken together, these top ten sectors accounted for more than 57% of the total human health risks from industrial air pollution nationwide. This reflects the phenomenon known as “disproportionality:” a small number of cases account for a large share of the problem (Berry 2008). One implication of disproportionality among both companies and sectors is that well-targeted corrective measures, undertaken in a small fraction of the economy, could go a long way toward cleaning up the nation’s air.

**Table 3: Top Ten Sectors by Toxic Score**

Sector (3-digit SIC code in parentheses)	Toxic score	Minority share	Low-income Share
Steel Works, Blast Furnaces, Rolling and Finishing Mills (331)	1,054	24.1	17.2
Iron and Steel Foundries (332)	939	41.3	16.6
Electric Services (491)	736	40.3	17.9
Industrial Organic Chemicals (286)	615	39.1	14.2
Plastics and Synthetic Materials (282)	437	30.0	15.5
Motor Vehicles and Motor Vehicle Equipment (371)	416	25.2	12.0
Industrial Inorganic Chemicals (281)	401	33.1	15.8
Fabricated Structural Metal Products (344)	393	33.7	15.3
Petroleum Refining (291)	381	51.3	19.0
Fabricated Metal Products (349)	371	54.4	16.3
Top ten total	5,741	37.3	16.0
Total (all sectors)	10,000	34.8	15.3

## TRACKING ENVIRONMENTAL JUSTICE

### A New Benchmark for Corporate Responsibility

Today there is growing interest in how companies compare in terms of their environmental performance. Investors, consumers, and the public at large want to know which companies are operating in a socially responsible manner – and which are not.

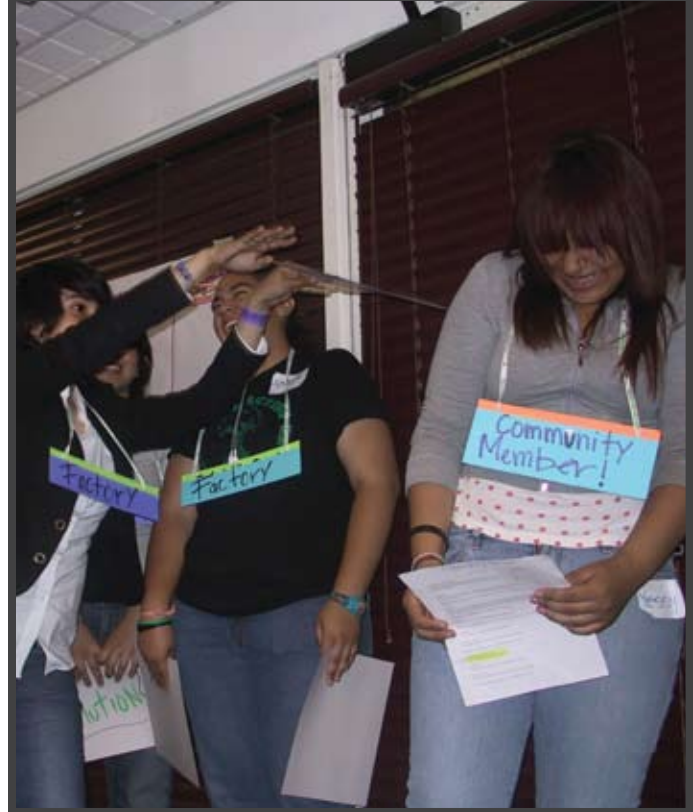
A corporation's environmental performance has many dimensions, including pollution from the facilities it owns, the occupational health and safety of its workers, and the impacts of its products once they are in the hands of consumers. We introduce here a new dimension: whether the majority of a company's pollution affects neighborhoods largely populated by people of color or by families living in poverty. This is the first time research has made the connection between polluted neighborhoods and the polluters who are responsible for toxic air.

As we have seen, environmental impacts can be quite uneven. In the case of toxic air pollution from industrial facilities, people of color and low-income communities suffer from unequal exposure. As in other dimensions of environmental performance, however, not all corporations are equally responsible or irresponsible. Some do better, some do worse.

Here we present two measures of corporate "environmental justice" performance. Both are based on the human health impacts from toxic air pollution released by facilities that they own: the first is a measure of unequal impacts on people of color, and the second is a measure of unequal impacts on people with incomes below the poverty line. Both are calculated using the same method we used to see whether minorities, for example, bear a larger share in particular states or metropolitan areas. We take the total health hazard from toxic air pollution of a particular company and compute the share borne by minorities or low-income people.

Figure 3 shows the ten corporations from the Toxic 100 list that have the highest shares of racial and ethnic minorities in their toxic scores. In all ten

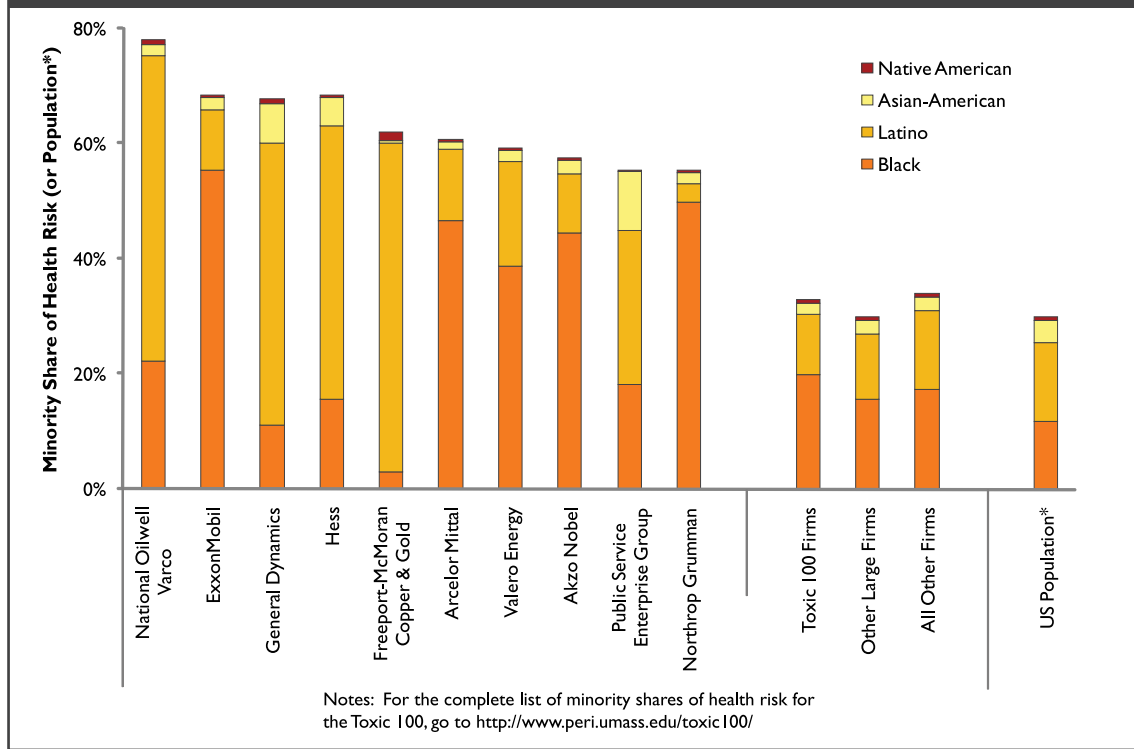
**Youth perform skit at a training on cumulative impacts by Communities for a Better Environment.**



cases, minorities bear more than half of the human health impact from the firm's toxic air releases. For example, minorities account for 69.1% of the impacts from facilities owned by ExxonMobil, but comprise only 31.8% of the population nationwide. The corresponding figures for blacks – for whom the disparity is most pronounced – are 55.5% and 11.8%. Two of the top ten firms in terms of disparate impact – ExxonMobil and Arcelor Mittal – also rank in the top ten in terms of their total toxic score (see Figure 2).

Figure 3 also shows the distribution of human health impacts from the whole set of Toxic 100 firms, from other large publicly traded firms that do not make the Toxic 100 list, and from all the other firms in the RSEI database. It is interesting to note that in all three groupings of firms, blacks are overrepresented compared to their share in

**Figure 3: Minority Share of Health Risk from Industrial Air Toxics  
Ten Corporations with the Highest Share Compared to All Other Firms and  
Minority Share of U.S. Population**



the national population, whereas other minorities are generally underrepresented. Comparing the impacts of large publicly traded firms to those of other (smaller or not publicly traded) firms, we find that Latinos and Native Americans tend to be more heavily impacted by the latter.

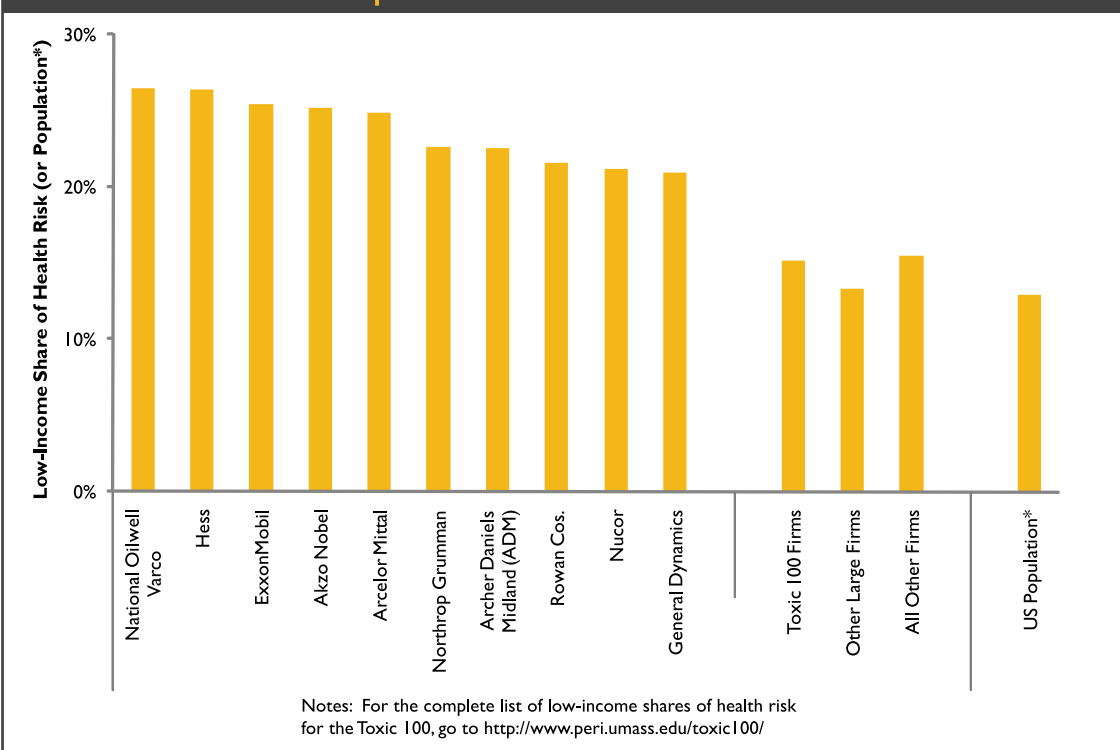
Figure 4 provides a comparable ranking based on the share of people living below the poverty line. There is considerable overlap with Figure 2: seven firms appear in both lists. In all ten cases, poor people account for more than 20% of the human health impacts from the firm's toxic air releases, compared to 12.9% of the population nationwide. Three of the

**Table 4: ExxonMobil Facilities  
Minority and Low-Income Shares of Health Risk from Industrial Air Toxics**

	Toxic score	Minority share	Black share	Latino share	Asian-American share	Native American share	Low-income share
Baton Rouge Refinery (LA)	42.7	78.0	75.3	1.1	1.0	0.1	31.1
Baton Rouge Chemical (LA)	17.0	73.1	70.0	1.2	1.1	0.1	29.1
Baytown Refinery (TX)	12.6	54.6	15.0	35.8	2.6	0.5	15.3
Torrance Refinery (CA)	4.6	69.9	10.8	40.9	15.5	0.7	15.1
Joliet Refinery (IL)	4.3	33.7	16.5	13.0	2.9	0.2	7.8
50 additional facilities	7.1	50.8	23.2	23.4	2.6	0.8	17.3
All Facilities	88.3	69.1	55.5	10.4	2.2	0.3	25.4



**Figure 4: Low-Income Share of Health Risk from Industrial Air Toxics  
Ten Corporations with the Highest Share Compared to All Other Firms and  
Low-Income Share of U.S. Population**



firms in the top ten – ExxonMobil, Arcelor Mittal, and Archer Daniels Midland – also rank in the top ten in terms of their total pollution score (see Figure 2).

A corporation's environmental justice performance, as reported in these figures, reflects both the average share of minority or poverty groups in the human health impacts from all its facilities and where its dirtier-than-average facilities are located. To illustrate, Table 4 gives breakdowns for the top five facilities owned by ExxonMobil, ranked by their toxic scores, and for 50 other ExxonMobil facilities combined. The top two facilities, both of them located in Baton Rouge, Louisiana,

**Concerns about toxics are international: U.S. and Filipino activists join together to protest hazardous waste incineration.**





**Table 5: Top Ten Sectors by Minority Share of Health Risk from Industrial Air Toxics**

Sector (3-digit SIC code in parentheses)	Toxic score	Minority share	Black share	Latino share	Asian-American share	Native American share
Fabricated Metal Products (349)	371	54.4	45.8	5.6	1.7	0.3
Petroleum Refining (291)	381	51.3	27.9	18.7	2.9	0.7
Asphalt Paving and Roofing Materials (295)	37	48.9	22.0	23.2	2.1	0.4
Railroad Equipment (374)	176	46.3	13.1	29.4	2.2	0.8
Agricultural Chemicals (287)	68	45.2	16.0	26.7	1.5	0.5
Electrical Machinery and Equipment (369)	89	43.0	34.5	5.3	1.8	0.3
Plastics Products (308)	269	42.1	16.7	18.9	4.3	0.7
Metal Cans and Shipping Containers (341)	61	41.8	15.1	20.9	4.1	0.6
Iron and Steel Foundries (332)	939	41.3	17.0	19.9	2.3	0.8
Ship and Boat Building and Repairing (373)	93	41.1	20.0	15.3	3.6	0.6
Total (all sectors)	10,000	34.8	18.1	12.6	2.2	0.6

*Note: Top ten sectors among those with a toxic score greater than 35.*

**Table 6: Top Ten Sectors by Low-Income Share of Health Risk from Industrial Air Toxics**

Sector (3-digit SIC code in parentheses)	Toxic score	Low-income share
Beverages (208)	123	24.8
Petroleum Refining (291)	381	19.0
Electric Services (491)	736	17.9
Agricultural Chemicals (287)	68	17.9
Steel Works, Blast Furnaces, Rolling and Finishing Mills (331)	1,054	17.2
Wood Products (249)	61	16.9
Iron and Steel Foundries (332)	939	16.6
Paperboard Mills (263)	41	16.6
Flat Glass (321)	39	16.6
Coating, Engraving, and Allied Services (347)	196	16.5
Total (all sectors)	10,000	15.3

*Note: Top ten sectors among those with a toxic score greater than 35.*

clearly drive the exceptionally high share of blacks in the corporation's environmental justice performance measure. It can also be seen that the next two facilities – refineries located in Baytown, Texas, and Torrance, California – have exceptionally high shares of Latinos and, in the latter case, Asian-Americans.

In addition to comparing individual firms, we can compare the environmental justice performance of different industrial sectors. In Table 5, we list the top ten sectors ranked by the minority share of health impacts from their toxic air pollution emissions. Topping the list are the fabricated metal products and petroleum refining sectors, each of which accounts for more than 3% of the total human health impact of toxic air pollution from industrial sources nationwide (as indicated by toxic scores greater than 300). As shown in the table, more than half of the health impact from facilities in both sectors is borne

by racial and ethnic minorities. In Table 6, we rank sectors by the share of low-income people in the health impact. The beverages industry tops the list, a result that is primarily attributable to emissions from Archer Daniels Midlands facilities in Illinois. The petroleum refining sector again places second.

Corporate environmental justice performance differs among firms within sectors as well as across sectors. To illustrate, Table 7 presents firm-specific information for the top firms in the petroleum refining sector. Because diversified corporations own facilities operating in a number of different industrial sectors, here we restrict the inter-firm comparison to the facilities they own in this specific sector. The share of minorities in total health impacts ranges from 24.5% in the case of Tesoro to 73.6% in the case of Pasadena Refining.

**Table 7: Minority and Low-Income Shares of Health Risk from Industrial Air Toxics from Oil Refining**

	Facilities	Releases	Toxic score	Minority share	Black share	Latino share	Asian-American share	Native American share	Low-income share
ExxonMobil	8	564	79.1	65.5	51.9	10.2	2.4	0.3	24.6
ConocoPhillips	17	790	62.1	34.8	19.6	10.6	2.3	0.9	15.4
Valero Energy	17	1,031	57.2	59.8	38.6	18.3	1.8	0.5	19.7
BP	6	386	33.5	56.2	16.4	32.6	5.8	0.6	16.3
Citgo Petroleum Corp.	7	314	20.1	47.8	28.5	15.7	2.3	0.4	19.4
Pasadena Refining System Inc.	1	36	17.3	73.6	12.6	57.7	2.4	0.6	25.1
Sunoco	5	176	17.1	34.0	22.9	5.8	3.8	0.3	16.3
Tesoro	6	315	16.9	24.5	2.6	11.6	5.9	1.8	10.0
Suncor Energy	1	35	14.0	45.3	6.9	33.6	2.5	1.3	12.9
Motiva Enterprises L.L.C.	5	173	10.1	42.2	35.6	4.1	1.4	0.3	16.8
Hess	2	110	8.6	67.4	14.6	49.8	4.9	0.3	26.9
Sinclair Oil Corp.	3	171	8.5	35.3	18.2	6.8	1.1	5.3	20.3
Royal Dutch Shell	6	291	7.8	43.5	8.8	25.5	6.0	1.0	12.2
Marathon Oil	7	364	7.7	33.8	16.3	13.6	1.9	0.6	14.3
Chevron	7	432	3.8	66.2	17.4	31.9	13.3	0.6	18.9
All Oil Refining	163	6,836	380.9	51.3	27.9	18.8	2.9	0.7	19.0
All Firms	102,636	16,470	10,000	34.8	18.1	12.6	2.2	0.6	15.3
US Population	-	-	-	31.8	11.8	13.7	3.7	0.7	12.9

## RECOMMENDATIONS

### From the Right-to-Know to the Right to Clean Air

The right-to-know movement in the United States scored a landmark victory with the creation of the Toxics Release Inventory. Building on this success, the U.S. Environmental Protection Agency launched the RSEI project to develop state-of-the-art information on not only the sources of industrial toxic emissions but also the geography of the resulting pollution exposure.

Meanwhile, in response to accumulating evidence indicating systematic patterns of disproportionate exposure to unsafe air and water among people of color and low-income communities, the environmental justice movement won its own landmark victory in 1994 when President Clinton signed an Executive Order directing every federal agency to identify and rectify “disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.”

Important as these accomplishments are, we have yet to achieve the goal of securing clean and safe air and water for all Americans.

There are four avenues along which we can work for further progress:

- **Defend and extend the right-to-know:** During the administration of President George W. Bush, the public’s right-to-know about environmental hazards was questioned. That administration proposed to raise the thresholds for reporting toxic emissions and to shift TRI reporting to an every-other-year basis. Activists mobilized to fend off most of these limits to the free flow of information. Today, the time is ripe for efforts to not only secure but expand our right-to-know.

One important step would be to strengthen enforcement of reporting requirements. Today there is little effort to verify the accuracy of the information submitted by industrial facilities in their annual TRI reports. It is possible that

many releases are underreported, or even go unreported. Environmental officials ought to be given adequate resources to enforce compliance and assist firms in improving the quality of the data. New efforts to collect data, particularly about greenhouse gas emissions, should include expanded coverage of “co-pollutants” – including the toxics that are the focus of this report – that can harm the health of surrounding communities.

- **Link modeling and monitoring:** Air pollution monitoring – that is, measurement of actual air pollution levels – would also improve the quality of information on community-level exposures. The RSEI model is a state-of-the-art tool for mapping exposure to pollutants from industrial sources, but models can only produce estimates. Partly because of inadequate funding, the government has failed to make use of its own RSEI project as a guide to help target air monitoring to locations with the greatest risk of exposure to toxic hazards.

Indeed, it fell to the newspaper USA Today to undertake the first such effort. Working with researchers at the University of Massachusetts Political Economy Research Institute (PERI) and at Johns Hopkins University, reporters identified the schools across America where the RSEI model predicted the greatest risks, and then sent teams with monitoring equipment to conduct measurements of pollutants at those sites. The results were published in December 2008, along with a website providing details on schools nationwide (see “Links” at the end of this report). In response to this report, Senator Barbara Boxer, who chairs the Senate Environment and Public Works Committee, pledged to “do what I have to do” to make sure that the government monitors the air quality in schools across the nation. “If USA Today can do this,” she declared, “certainly the EPA can do this.”

- **Adopt a cumulative impacts approach to pollution standards:** Most of the toxic air pollution reported in the TRI is not illegal: the emissions are within the existing legal limits, if any limits have been established. But the same community can be affected by releases of pollutants from many facilities. One of the great merits of the RSEI model is that it permits assessment of cumulative exposures from multiple pollution sources.

At a minimum, the resulting health impacts can be expected to be additive as hazard piles upon hazard; at worst, they may be multiplicative due to interactions among toxic pollutants.

The cumulative nature must be taken into account by federal and state environmental protection agencies. Environmental justice activists have raised awareness of this issue, since the communities with the greatest cumulative burdens often have the largest numbers of minorities and low-income families. If government agencies truly are to rectify “disproportionately high and adverse human health or environmental effects,” they must frame regulatory standards to take account of cumulative impacts.

**It's not just industry: Activists from the Oakland Coalition for Clean & Safe Ports bring together residents and truckers to call for reducing emissions and generating good local jobs.**



- **Encourage community, shareholder, and consumer activism:** As reductions in pollution in response to the Toxics Release Inventory have demonstrated, corporations can be spurred to protect human health and safety not only by government standards but also by public opinion, community mobilization, and shareholder involvement. Where environmental harms may ultimately lead to financial liabilities for clean-up or compensation, a reasonable case can be made that improved performance is a fiduciary responsibility as well as a moral imperative. Moreover, many companies have themselves caught the environmental bug and are trying hard to be better custodians of the planet.

The corporate environmental justice scorecard we have offered here may be a new tool to promote informal regulation and encourage corporate responsibility. The New York-based Interfaith Center on Corporate Responsibility, by way of example, assists community-based organizations across the country that are fighting for a healthier environment by educating them about shareholder democracy and by supporting corporate dialogues and shareholder campaigns. Such efforts now can be backed with systematic data on corporate performance, including “in-class” comparisons with other firms in the same industry, to accompany specific information on affected communities.

All four avenues – defending and extending the right-to-know, linking modeling and monitoring, shifting pollution standards to assess cumulative impacts, and encouraging community, shareholder and consumer activism – can help to protect our right to clean air and reduce environmental disparities. By reinforcing each other, all four can create a virtuous circle in which the whole is more than the sum of its parts.

Such a holistic approach is in tune with our times. Former vice president Al Gore challenged the nation to address the historic threat of climate change by presenting us with “an inconvenient truth” – that our collective actions, and inaction, threaten the planet and the well-being of our children and grandchildren. Equally inconvenient is the truth that America’s history of racial inequality has been stamped not only on labor and housing markets, but also on the very air we breathe.

But history is not destiny. We can develop smart environmental policies that strengthen communities most affected by pollution. We can shoulder our responsibilities as citizens, communities, and corporations. We can secure a future in which the right to clean air is truly shared by all.

We hope that this report contributes to a broader conversation about these goals and strategies to achieve them, particularly as we face the new challenges brought by climate change and the need to reduce carbon dioxide and other greenhouse gas emissions. Just as science and policy are coming together in that arena to offer hopeful solutions, we trust that the mix of data analysis and policy recommendations we offer here will be of use to those activists, policy makers, and companies who are working daily to protect the environmental health and well-being of all Americans.



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## Links

- Corporate Toxics Information Project, Political Economy Research Institute, University of Massachusetts, Amherst: <http://www.peri.umass.edu/ctip>.
- Interfaith Center on Corporate Responsibility, Environmental Justice Working Group: <http://www.iccr.org/issues/envjustice/>.
- National Institute for Occupational Safety and Health, "Pocket Guide to Chemical Hazards": <http://www.cdc.gov/niosh/npg/>.
- Right-to-Know Network (RTK Net): <http://www.rtknet.org/>.
- Risk-Screening Environmental Indicators, U.S. Environmental Protection Agency: <http://www.epa.gov/oppt/rsei/>.
- Toxic 100: The Top Corporate Air Polluters in the U.S.: <http://www.peri.umass.edu/toxic100/>.
- Toxics Release Inventory, U.S. Environmental Protection agency: <http://www.epa.gov/tri/>
- USA Today, "The Smokestack Effect: Toxic Air and America's Schools": <http://content.usatoday.com/news/nation/environment/smokestack/index>.

We have tried to offer a broad overview of the methods in the text; for many of the details, particularly on the underlying micro-data, the geographic grid, and the underlying data calculations, readers should turn to Michael Ash and James K. Boyce, “Measuring Corporate Environmental Justice Performance,” Amherst, MA: Political Economy Research Institute, Working Paper No. 186, available at <http://www.peri.umass.edu/236/hash/e8cf598368/publication/326/>

Here we offer a few details for more technically inclined readers. First, we note that the “toxic score” in this document differs slightly from the definition used in the Toxic 100 Index (Political Economy Research Institute, University of Massachusetts, Amherst). In the Toxic 100 Index, toxic score refers directly to the RSEI score as reported by the EPA, a unitless value representing the chronic human health risk from a release. Here, toxic score refers to the share of the chronic human health risk attributed to any particular corporation, where the total score for all 2005 air releases is normalized at 10,000. The normalization preserves the ranking and relative impact of the corporations; for example, in Figure 2, which presents the top ten, the first corporation is responsible for about three times more health impact than the tenth corporation on that list. Because we use “share” throughout to refer to relative burdens for people of color and low-income communities, we use the term “score” to describe this share-based measure of the overall human health impact.

To calculate the toxic score, the underlying toxicity model addresses chronic human health effects associated with long-term exposure; the risk includes both cancer and noncancer effects, such as developmental toxicity, reproductive toxicity, and neurotoxicity. Toxicity weights are based on a peer-reviewed system, taking into account the single most sensitive chronic human health endpoint for inhalation exposure, and do not reflect interactive, multiple, or acute health effects. For more detail,

including strengths and limitations of the RSEI approach to toxicity weighting, see <http://www.epa.gov/oppt/rsei/pubs/caveats.html#toxicity>.

On Wednesday, April 1, 2009, EPA issued RSEI version 2.2.0, which includes data through 2006. All of the findings in this report, which was in press when the new data were released, are from RSEI version 2.1.5. We encourage readers to download version 2.2.0 from [http://www.epa.gov/oppt/rsei/pubs/get\\_rsei.html](http://www.epa.gov/oppt/rsei/pubs/get_rsei.html). We alert users to two changes in the RSEI methodology that may revise the results for 2005, including the data that we present in this report. First, EPA has changed its plume model from ISCLT3 to AERMOD. Although both provide unbiased plume-based models of exposure, concentration estimates may differ between the models. Second, some toxicity weights have been updated to reflect current consensus on the hazard from TRI-listed chemicals.

With regard to geography, the crucial link to determining the relative impacts on sub-groups, the reference to “neighborhood” in the text means census block group. The toxic concentration figures are cross-walked between the underlying RSEI pollution grid and census blocks, but we average the figures to the block group in order to make use of income data, which are only available at the block group level.

On the demographic side, any mention of “low-income” people in the text refers to all people falling below the federal poverty level in 2000; any mention of “minority” or equivalently “people of color” refers to all people responding to the 2000 Census who are not non-Hispanic white. The term “Asian-American” refers to Asians and Pacific Islanders.

We should note one important nuance in our calculations of the share of health risk borne by particular minority groups (Figure 3 and Tables 4

and 5): adding up Latino, Black, Asian, and Native American shares may not precisely total the minority share. The reason is that to obtain the RSEI scores we attribute toxicity effects that take into account age structure and where possible gender (since EPA inhalation factors are different by these sub-groups). The demographic measures we use come from Summary File 3 (SF3) of the Census, which is the only source for income at the block group level. In SF3, age breakdowns are available for non-Hispanic white and all Hispanics but not for non-Hispanic Blacks or Asians; instead, we are forced to use the age breakdown for all Blacks and all Asians.

The metropolitan area definitions that we use in Tables 1 and 2 were those extant at the time of the 2000 Census. Thus, we are not using the more recent Core Based Statistical Areas but the Metropolitan Statistical Areas (MSAs), Primary Metropolitan Statistical Areas (PMSAs), and New England County Metropolitan Areas of that era (based on the June 30th, 1999 US Census Bureau's classification). As noted in the text, the universe for the top ten selection was restricted to metropolitan areas (under the above scheme) that were both among the top half (165) in terms of overall toxicity-weighted resident exposure and the top 100 in terms of total population.

Finally, in Tables 3 and 4, the category of "Other Large Firms" refers to those companies that are in the Fortune 500, Fortune Global 500, S&P 500, or Forbes Global 2000 but are not in the Toxic 100 (the top polluters in that set). The "All Other Firms" category simply sums up the remainder of the toxic scores; most of these firms are smaller than those in the 500 (or 2000) lists, but some are large firms that are not publicly traded.

## **How to Order the Latest RSEI Data from EPA**

Go to the following site to order the latest RSEI public-release data on CD-ROM, with facility-by-facility information on toxic emissions:

[http://www.epa.gov/oppt/rsei/pubs/get\\_rsei.html](http://www.epa.gov/oppt/rsei/pubs/get_rsei.html).

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