Lecture 20: Environmental Justice in Regulation 2

Prof. Austin
Environmental Economics
Econ 475

Part 1: Environmental Justice Analysis for Regulatory Purposes

Environmental Justice Analysis as a Priority

Executive orders:

- Executive order 12898
- Executive order 14008
  - Signed January, 2021

SECURING ENVIRONMENTAL JUSTICE AND SPURRING ECONOMIC OPPORTUNITY

Sec. 219. Policy. To secure an equitable economic future, the United States must ensure that environmental and economic justice are key considerations in how we govern. That means investing and building a clean energy economy that creates well-paying union jobs, turning disadvantaged communities — historically marginalized and overburdened — into healthy, thriving communities, and undertaking robust actions to mitigate climate change while preparing for the impacts of climate change across rural, urban, and Tribal areas. Agencies shall make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts. It is therefore the policy of my Administration to secure environmental justice and spur economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution and underinvestment in housing, transportation, water and wastewater infrastructure, and health care.

Justice40 Initiative

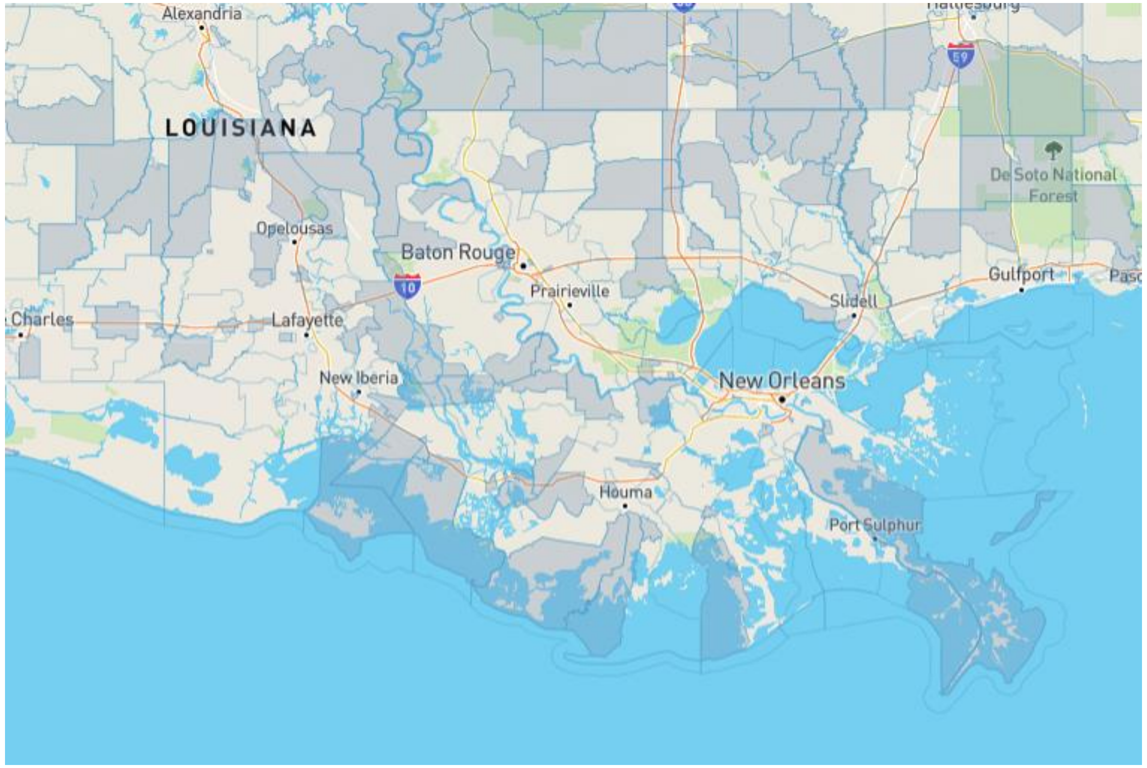


Figure: Disadvantaged communities in Southern Lousisiana according to CEJST (link to tool).

What is the Justice40 Initiative?

For the first time in our nation's history, the Federal Government has made it a goal that 40 percent of the overall benefits of certain Federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution. President Biden made this historic commitment when he signed Executive Order 14008 within days of taking office.

Environmental Justice Analysis as a Priority

Image source: [Meet Michael Regan](#) by NRDC

The Administrator has asked Agency employees to "infuse equity and environmental justice principles and priorities into all EPA practices, policies, and programs."

In the context of rulemakings:

- "Assessing impacts to pollution-burdened, underserved, and Tribal communities in regulatory development processes and considering regulatory options to maximize benefits to these communities," and

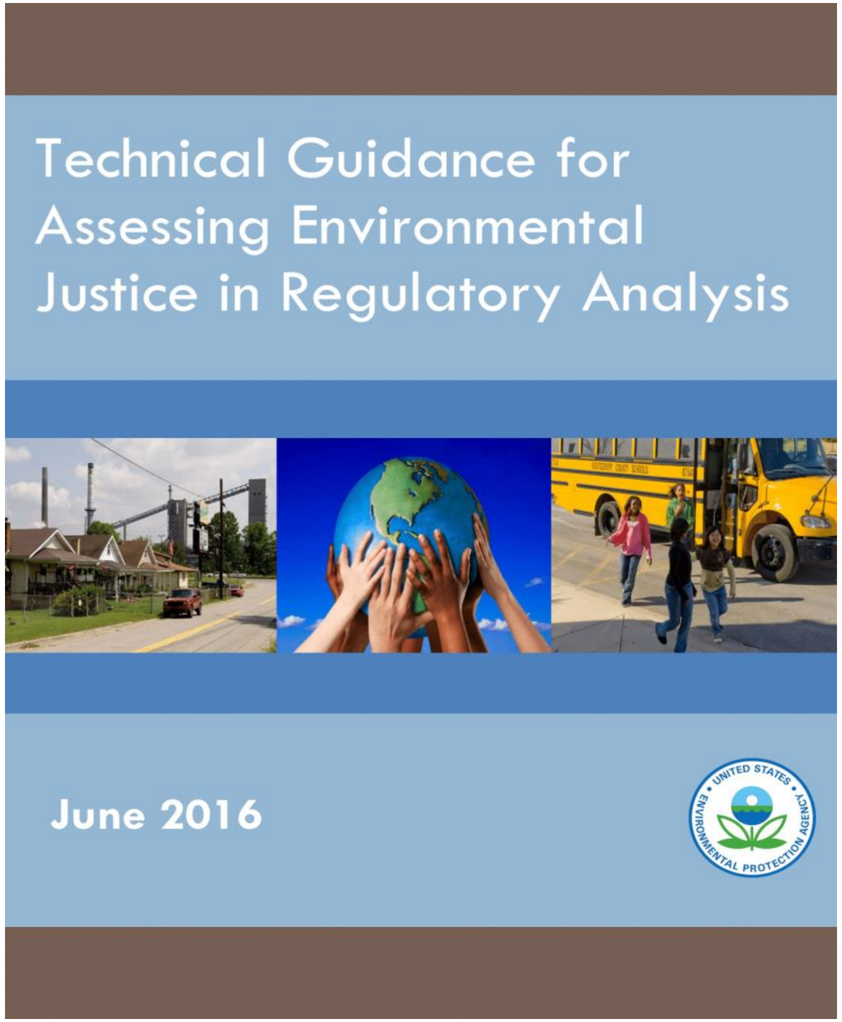
- "Taking immediate and affirmative steps to improve early and more frequent engagement with pollution-burdened and underserved communities affected by agency rulemakings, permitting and enforcement decisions, and policies."

- April 7, 2021 Administrator's Memo

Environmental Justice Analysis

EPA's *Technical Guidance for EJ Analysis*:

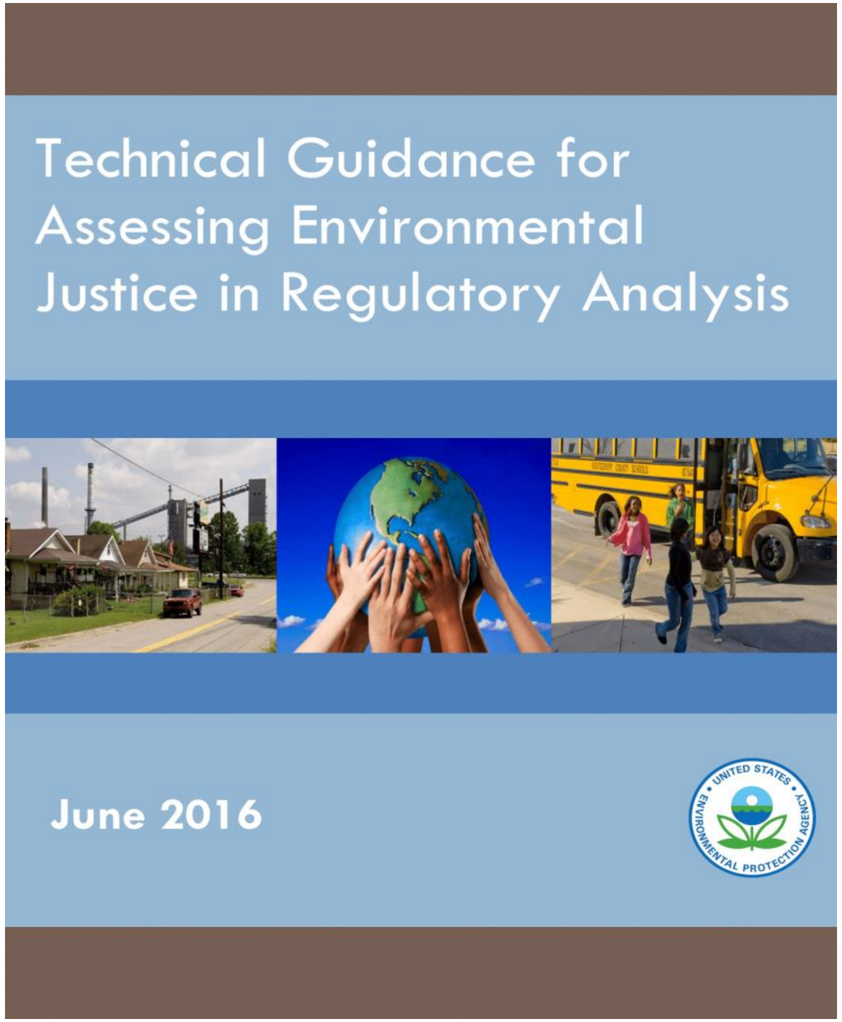
- Underwent extensive internal review by all program offices, public comment, and peer review by EPA's Science Advisory Board
- Finalized in 2016 but never properly implemented
- Outlines approaches for risk assessors and economists to evaluate EJ concerns for significant policy actions
  - 2022 Strategic Goal to have EJ Analyses in at least 80% of significant policy actions.



What is an EJ Analysis?

What is ***not*** an EJ Analysis?

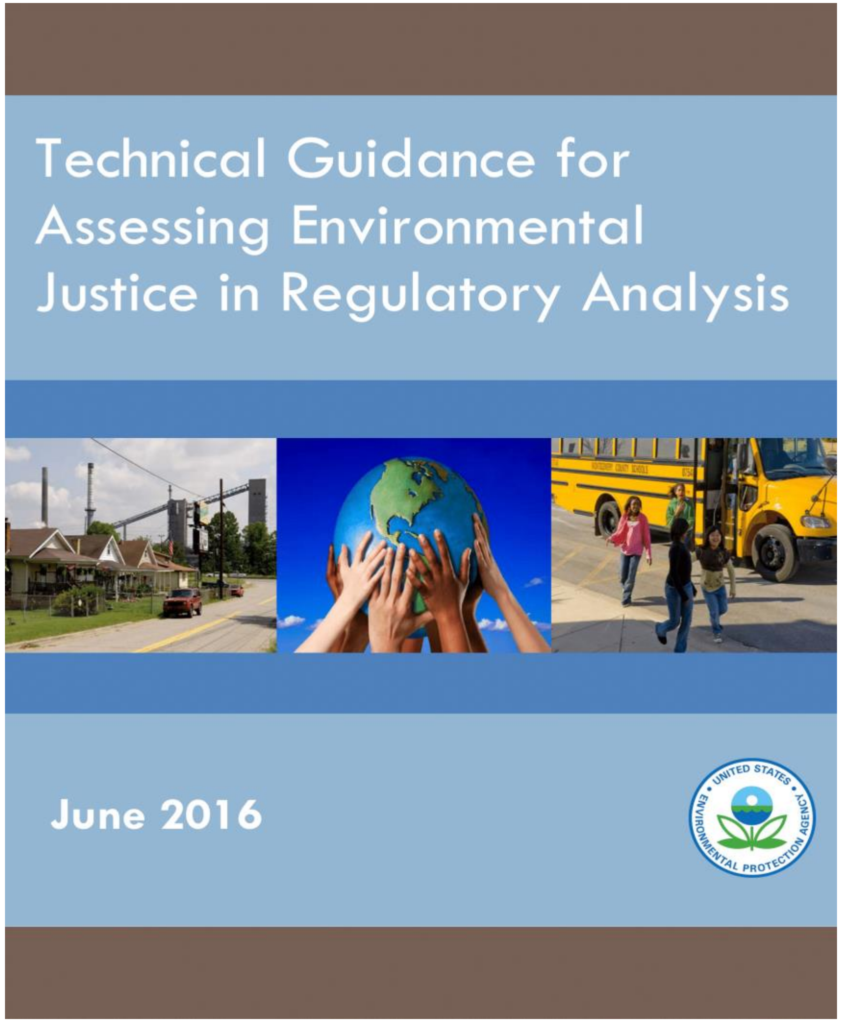
- Saying no analysis is necessary because the action improves environmental quality.
- Distributional analysis of costs and benefits.



Distributional Analysis ≠ EJ Analysis

An EJ analysis is distinct from a distributional analysis:

- ➢ Distributional analysis is an evaluation of incidence of benefits or costs by different members of society (often income quintiles)
- ➢ EJ analysis puts more emphasis on baseline conditions such as pre-existing exposure, cumulative impacts, and distribution of health impacts over population groups of concern.



Goals of EJ Analysis

An EJ Analysis seeks to answer three questions:

1) Is there evidence of potential EJ concerns in the baseline for population groups of concern?
2) Do the regulatory option(s) under consideration affect the potential EJ concern?
3) Do the regulatory option(s) under consideration exacerbate or mitigate EJ concerns relative to the baseline?

Key Terms: Potential EJ Concern

Procedural Justice

2.1 Potential EJ Concern and Disproportionate Impacts

A *potential EJ concern* is defined as "the actual or potential lack of fair treatment or meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples in the development, implementation and enforcement of environmental laws, regulations and policies" (U.S. EPA, 2015a). For analytic purposes, this concept refers more specifically to "disproportionate impacts on minority populations, low-income populations, and/or indigenous peoples that may exist prior to or that may be created by the proposed regulatory action" (U.S. EPA, 2015a).[8]

Distributive Justice

Other Key Terms

- **Groups of Concern**
  - American Indian or Alaska Native, Asian, Black, Native Hawaiian and Pacific Islander, and Hispanic
  - Characteristics associated with vulnerability: low income, over age 65, under 5, women of child-bearing age, linguistic isolation, others
- **Baseline**
  - The way the world looks absent a regulation (i.e., a counter-factual).

Key Terms: Vulnerability

"A matrix of ***physical, chemical, biological, social, and cultural factors*** *that result in certain communities and subpopulations being more susceptible to environmental factors because of* ***greater exposure*** *to such factors or* ***a compromised ability to cope with and/or recover*** *from such exposure."*

Source: WHO (2006). Principles for Evaluating Health Risks in Children. Environmental Health Criteria 237

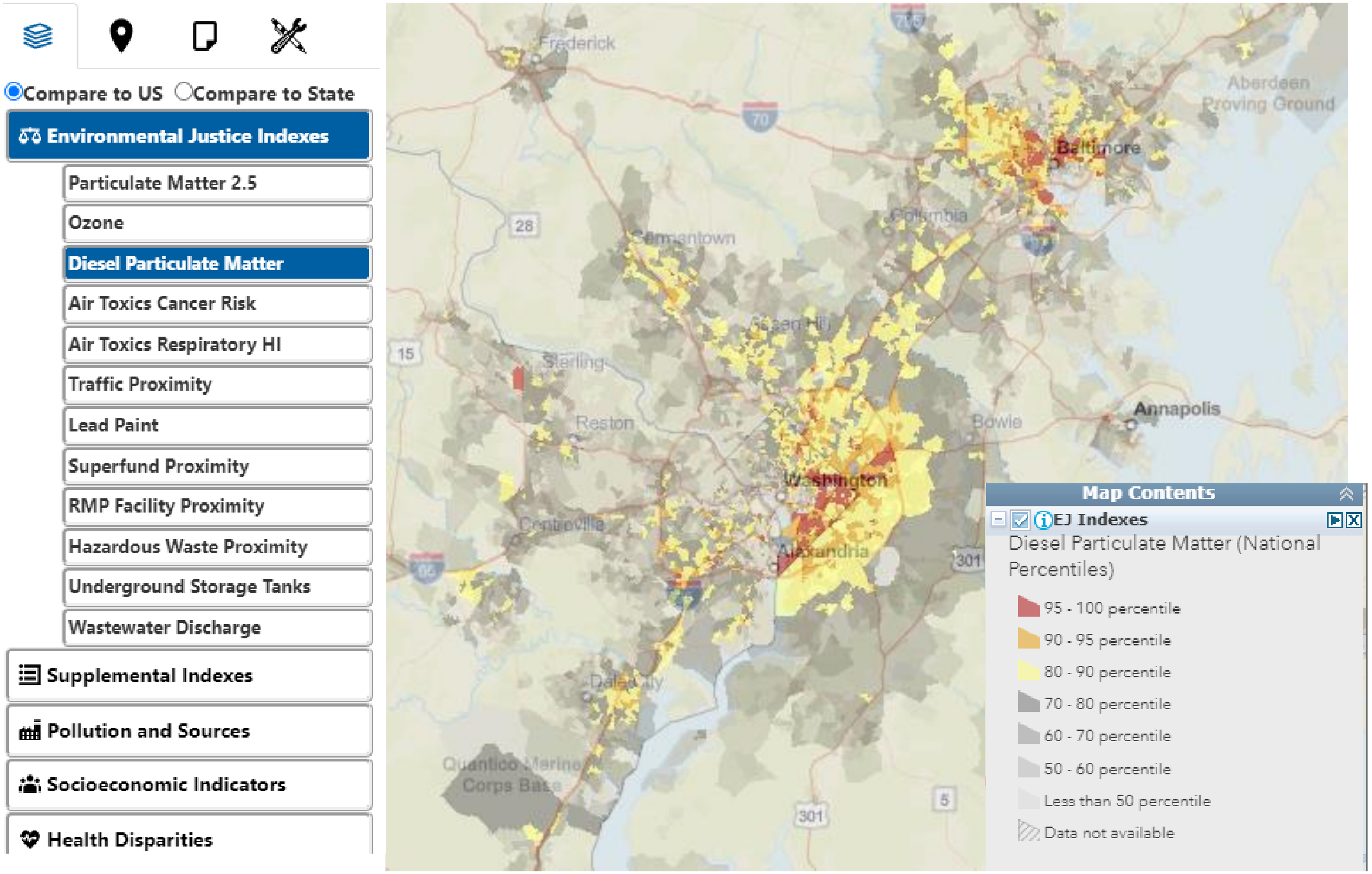
Some Steps in the Process

Early **screening assessment**:

- Review availability of data and analytic methods
- Evaluate literature and stakeholder input
- Identify indicators of potential EJ concerns
  - Proximity, potential for hotspots, number of sources, nature and amounts of pollutants already impacting relevant populations, unique exposure pathways, unique vulnerabilities, etc.

EJSCREEN version 2.0

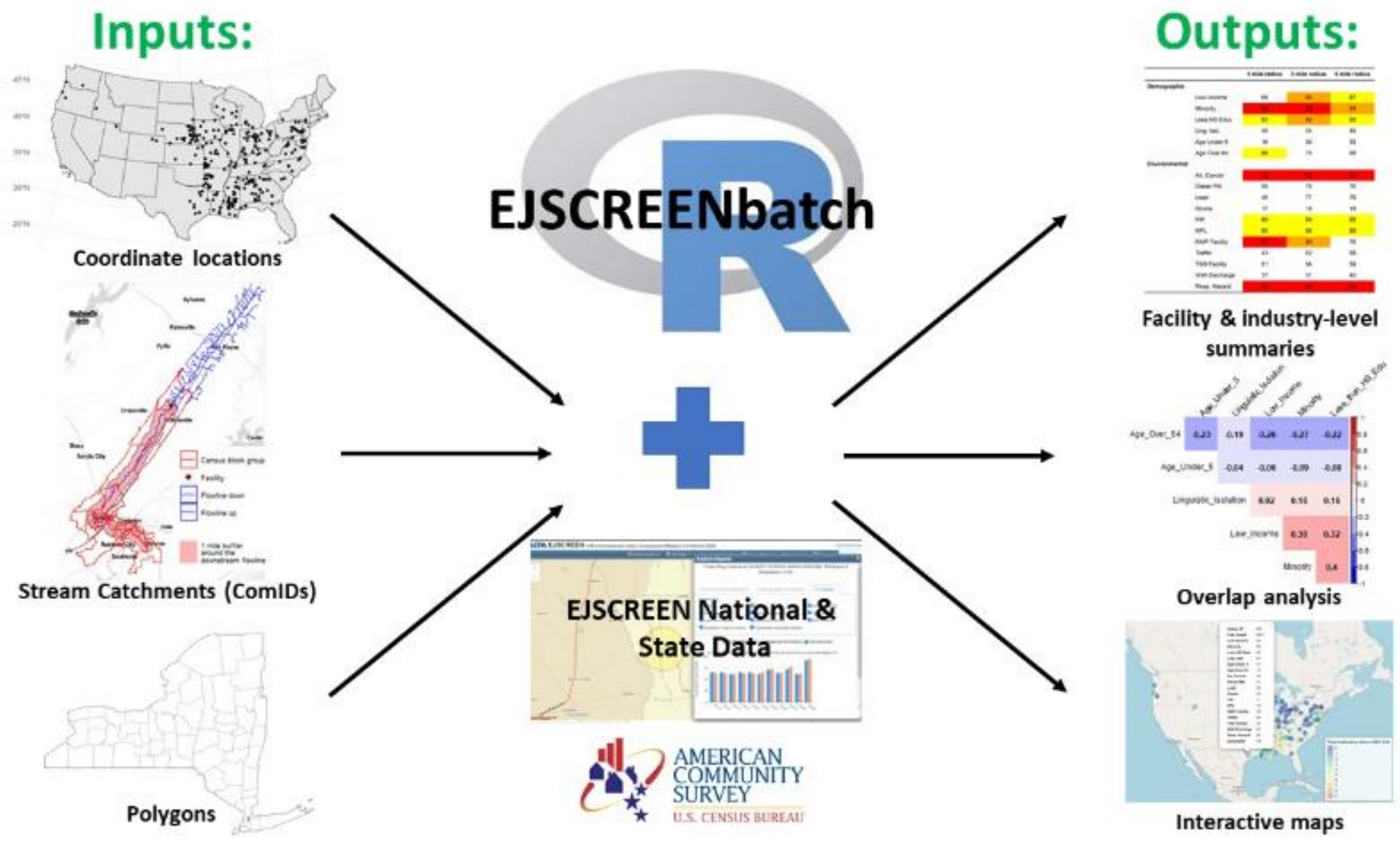
- Nationally consistent environmental and demographic data in maps
- Block-group level data
- State/national levels and percentiles as basis of comparison
- Allows custom buffers, threshold maps, batch analyses
- Indices to highlight the intersection between environmental and socioeconomic factors



EJSCREENbatch

EJSCREENbatch is an open-source processing tool that allows inputting many locations and fetching aggregate EJSCREEN information and other demographic information.

- Github repo.



EJSCREENbatch: Example of 3M Plant in Cordova, Illinois

The 3M Specialty Film and Media Products Plant manufactures PFAS. According to NPDES DMR reports, it released:

- 26,000 kg of 10 unique PFAS, especially PFBA, over the period from 2018-2021.

A buffer approach for all tracts within 20-miles around the facility and a 180-mile distance downstream includes 282 CBGs with a population of 290,000.

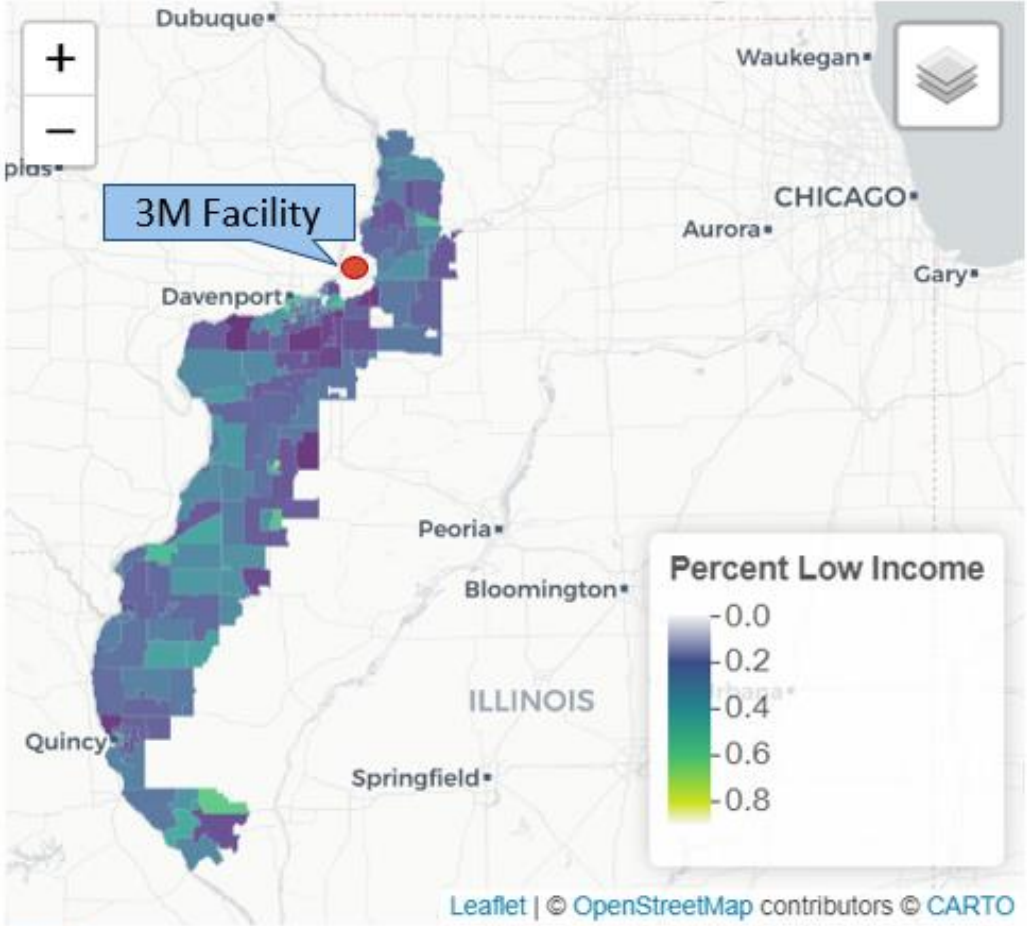


Figure: Illinois CBGs within 20 miles of the 3M Facility and within 20 miles of a 180-mile downstream trace.

EJSCREENbatch: Example of 3M Plant in Cordova, Illinois

Service Boundaries can be used to screen across the 95 census block groups served by water systems with PFAS detections.

EJSCREEN Indicator	Average (Detect = 1)	Average (Detect =0)	State Average	National Average
Pct. Minority	33.5	27.1	28.7	31.4
Pct. Low Income	30.6	9.5	38.6	39.9
Pct. Linguistic Isolation	2.5	0.6	4.8	5.4
PM 2.5	9.3	9.1	9.9	8.7
Traffic Proximity	470.7	163.1	752.0	705.0
Pct pre-1960 Housing	56.5	44.7	39.9	27.2
Population	111,517	179,598		

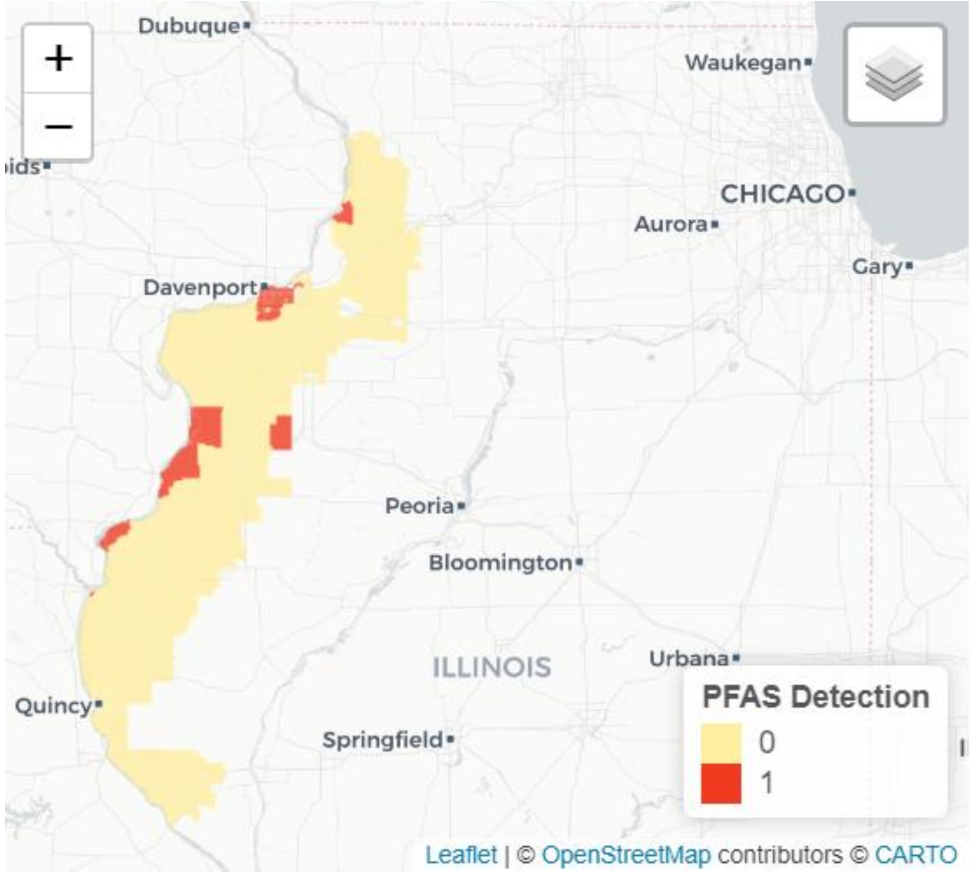


Figure: Illinois CBGs with a detection any of 12 PFAS from 2016-2021. Data source: Illinois Drinking Water Watch website

Other Steps in the Process

More in-depth assessment if warranted and where possible:

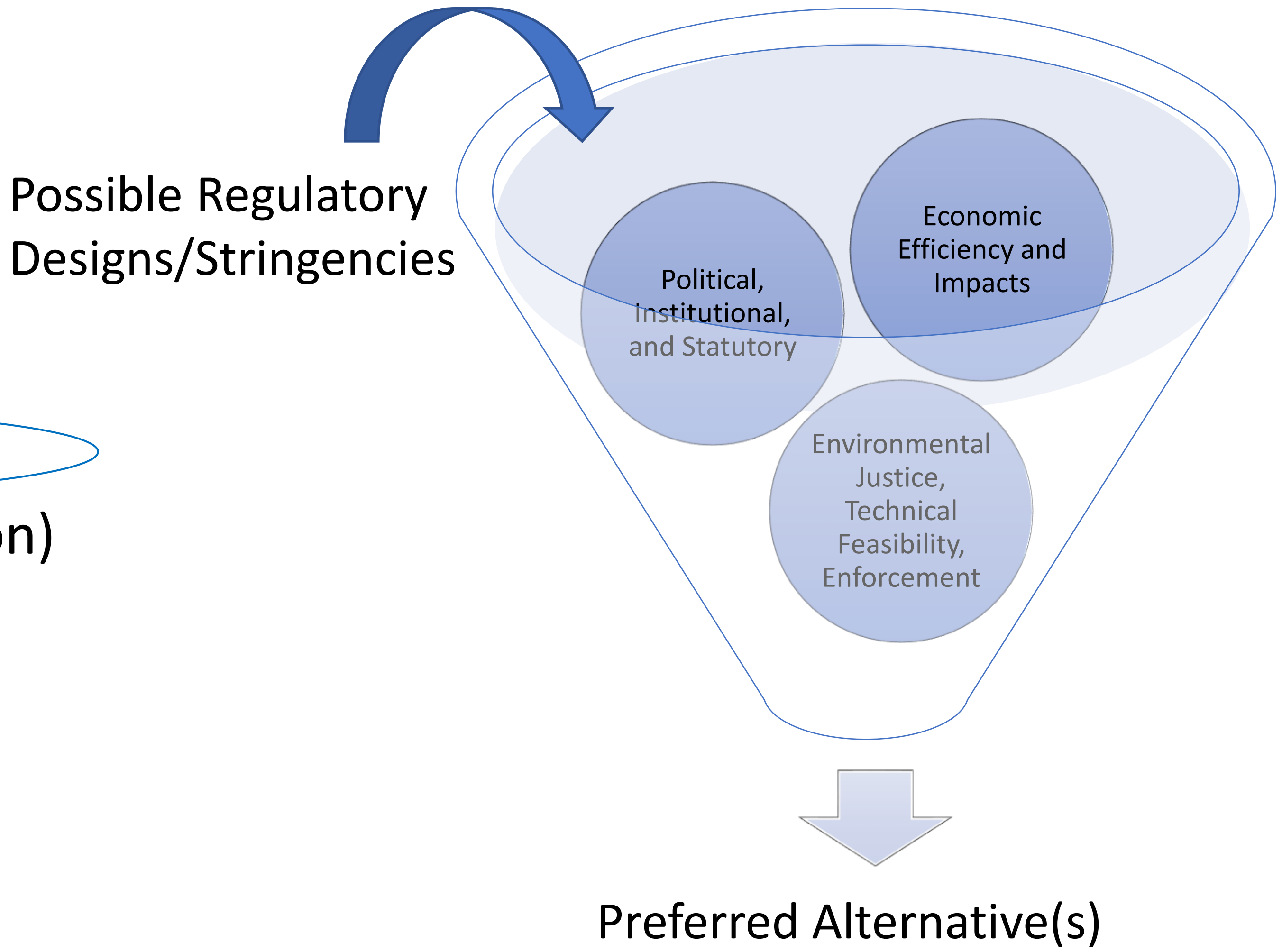
- Select relevant geographic scope, scale, and comparison groups
- Capacity for more nuanced approaches dictated in part by ability to build from risk and benefits assessments

Pre-proposal community engagement:

- Recent examples: oil & gas NPSPS, steam electric ELG, PFAS NPDWR

How Analysis Ultimately Informs Regulatory Design

- Political Factors
- Statutory Instruction
- Institutional Feasibility
- Benefits and Costs (Economic Efficiency)
- Environmental Justice
- Economic Impacts (Distribution)
- Technical Feasibility
- Enforceability
- Ethics
- Sustainability

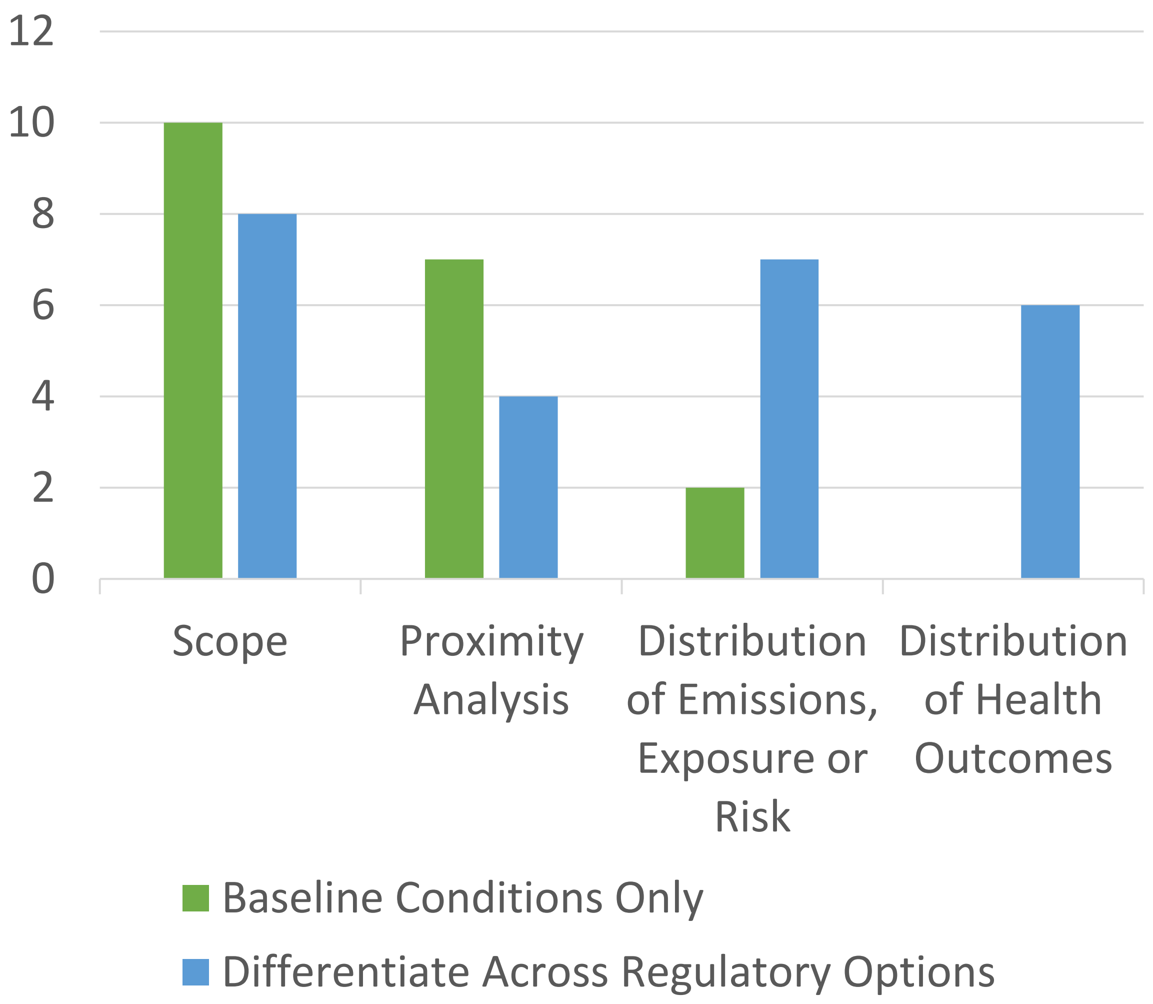


Quantitative EJ Analyses 2012-2021

- Inventory of EJ analyses for economically significant final rules, Jan 2012 – Jan 2021.
- More than half quantitatively evaluated potential EJ concerns
  - Majority only characterize baseline
  - Often rely on proximity analysis

Years	Total Final Rules	Total with EJ Analysis	Total with Quantitative EJ Analysis	Percent with Quantitative EJ Analysis
2012-14	11	6	5	45%
2015-17	12	11	7	58%
2018-21	11	9	6	55%
Total	**34**	**26**	**18**	**53%**

Quantitative EJ Analyses 2012-2021



Part 2: EJ Analyses for Regulations

Examples of EJ Analyses

Rule	Exposure/ Health Effects	Proximity Analysis	Visual Displays	Other Quantitative	Qualitative
Lead Clearance Standard (2020)	√ (BLLs; IQ loss)				
Formaldehyde Stds for Composite Wood Products (2016)	√ (cancer; sensory irritation)				
Definition of Solid Waste (2015)		√		√ (other vulnerability factors)	
Mercury and Air Toxics Standards (2011)	√ (IQ loss; mortality risk)	√ (as proxy for HAP exposure)	√ (for PM2.5 exposure)		√
CAFO Reporting Rule (2011)			√ (proximity)		

AIM Act

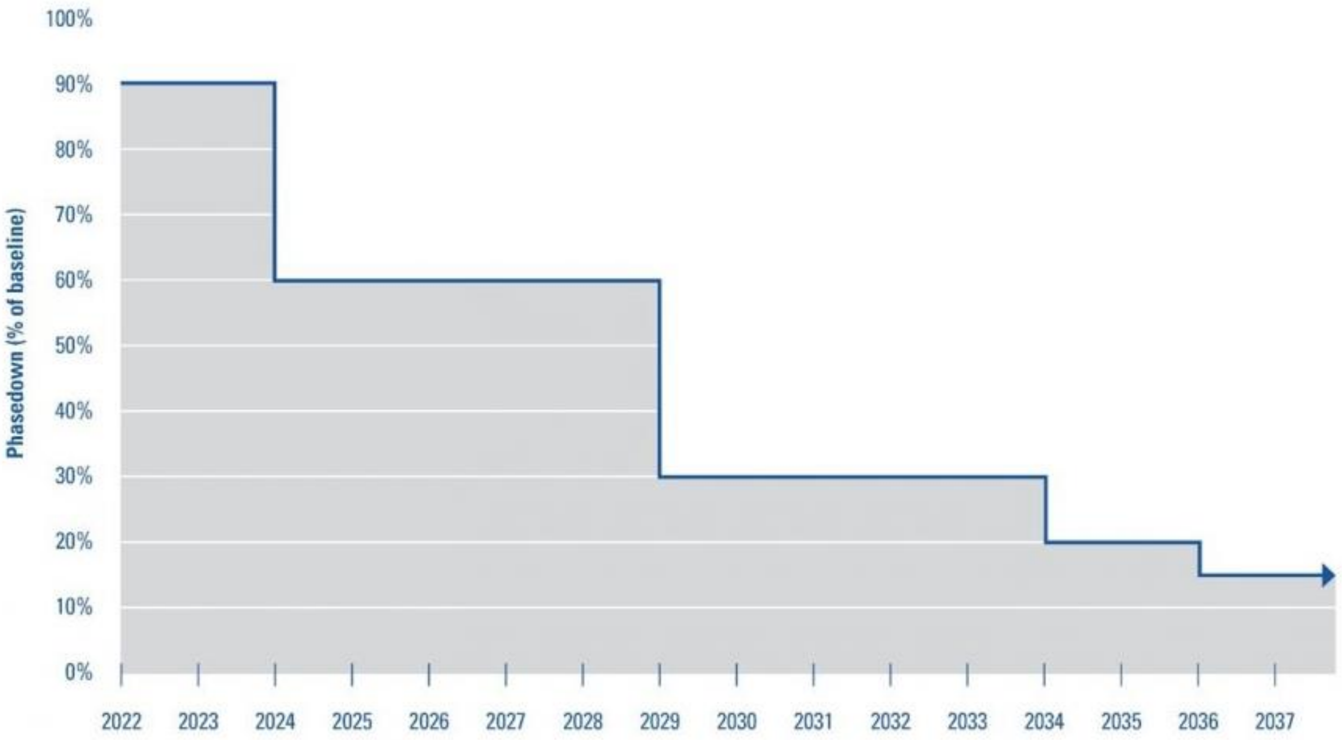
American Innovation and Manufacturing (AIM) Act to incentivize less use of hydroflourocarbons (HFCs)

- HFCs developed to replace ozone depleting substances
- HFCs used in refrigeration, air conditioning, aerosols, fire suppression, and foam blowing sectors.
- HFCs have global warming potential (GWP) hundreds to thousands of times greater than carbon dioxide

AIM Act

American Innovation and Manufacturing (AIM) Act to phase down use of hydroflourocarbons (HFCs):

- Phase down schedule is based on allowances that can be traded.



AIM Act EJ Concerns

- No local effects from direct exposure to HFCs
- Potential EJ concerns about feedstocks, catalysts and byproducts of HFC production
  - Rely on toxic chemicals for production (e.g., carbon tetrachloride, hydrochloric acid, vinyl chloride, trichloroethylene (TCE), hydrogen fluoride)
- Some lower GWP HFC alternatives also rely on toxic chemicals

AIM Act EJ Analysis

Key Elements:

- Describe possible health effects of feedstock chemicals and potential risk of exposure for workers
- Present profile of toxic releases associated with HFC production at each facility overall and by chemical
- Proximity analysis to examine nearby community characteristics and cumulative risk of exposure
- Summarize recent compliance and enforcement history of HFC facilities
- Describe possible health effects from toxic chemicals used to produce HFC substitutes

Health Effects of Byproducts or Feedstocks of HFC Production

HFC production uses chemical feedstocks and catalysts or produces byproducts that are toxic and/or may lead to serious health impacts for local communities and workers.

Chemical Name	Health Effects
Antimony Compounds	Metabolic, Other Systemic
Carbon tetrachloride	Cancer, Developmental, Hepatic, Reproductive
Chlorine	Ocular, Respiratory
Chloroform (trichloromethane)	Cancer, Developmental, Hepatic, Renal, Respiratory
Chromium Compounds	Cancer, Gastrointestinal, Hematological, Respiratory
Cobalt Compounds	Cancer, Hematological, Respiratory
1,1-Dichloroethane	No information available
1,2-Dichloroethane	Cancer, Hepatic, Renal
Hydrochloric acid	Respiratory
Hydrogen fluoride	Ocular, Respiratory
Methylene chloride (Dichloromethane)	Cancer, Hematological, Hepatic, Neurological
Nickel Compounds	Body Weight, Cancer, Hematological, Immunological, Respiratory
Tetrachloroethylene (Perchloroethylene)	Body Weight, Cancer, Developmental, Hepatic, Neurological, Ocular, Renal, Respiratory
1,1,1-Trichloroethane	Body Weight, Hepatic, Neurological
Trichloroethylene	Cancer, Cardiovascular, Developmental, Immunological, Neurological, Ocular
Vinyl chloride	Cancer, Developmental, Hepatic, Neurological, Ocular, Respiratory
Vinylidene chloride (1,1-dichloroethylene)	Hepatic, Other Systemic

Health Effects of Byproducts or Feedstocks of HFC *Substitute* Production

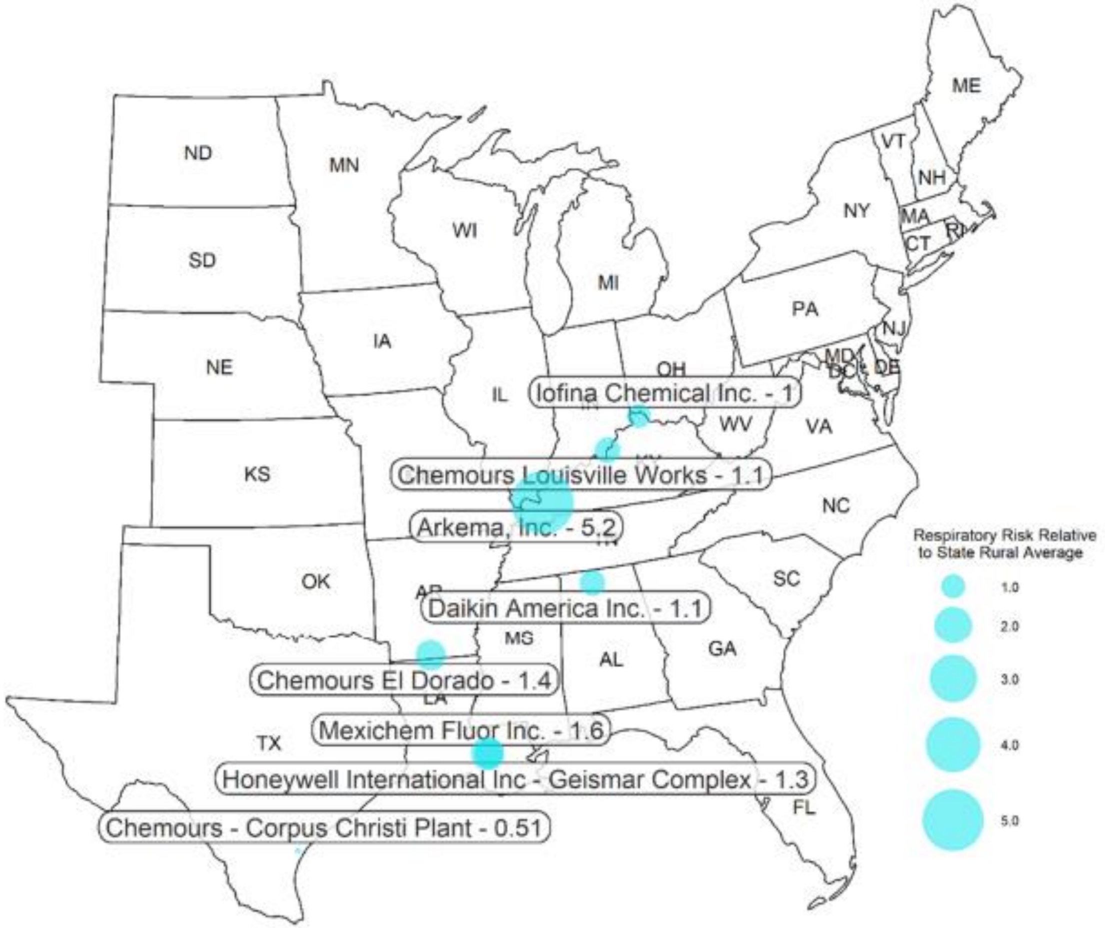
Some substitutes also use chemical feedstocks or release byproducts that have adverse health effects for local communities or workers

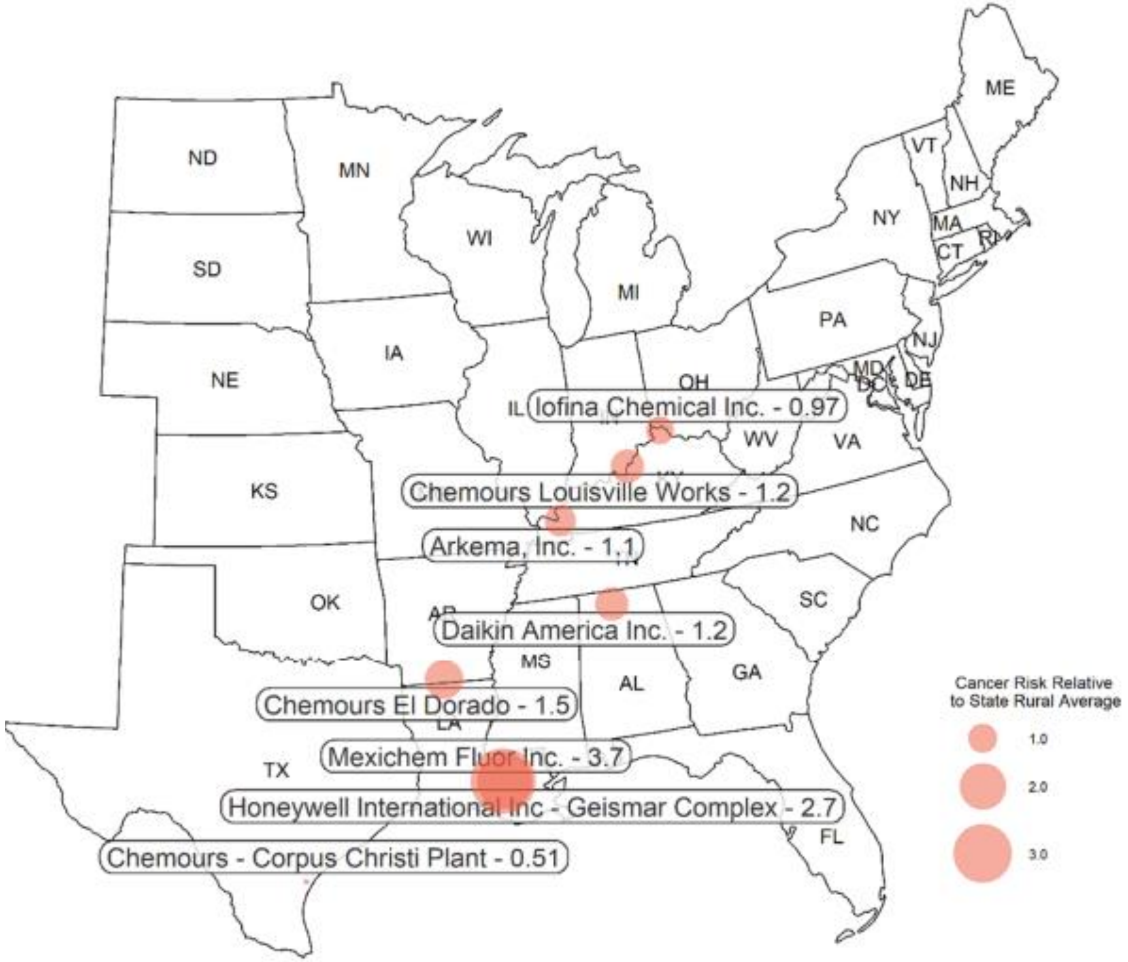
Chemical Name	Health Effects
Antimony compounds	Metabolic, Other Systemic
Carbon tetrachloride	Cancer, Developmental, Hepatic, Reproductive
Chlorine	Ocular, Respiratory
Chloroform (trichloromethane)	Cancer, Developmental, Hepatic, Renal, Respiratory
Chromium compounds	Cancer, Gastrointestinal, Hematological, Respiratory
Hydrochloric acid	Respiratory
Hydrogen fluoride	Ocular, Respiratory
Methyl bromide (Bromomethane)	Cancer, Hepatic, Renal
Methyl chloride (chloromethane)	Hepatic, Neurological
Nickel compounds	Body Weight, Cancer, Hematological, Immunological, Respiratory

Evaluation of 8 HFC Facilities

Facility name	City	State	Number of Employees	2019 HFC Emissions (MT CO2e)	Air releases of toxic HFC production chemicals	Water releases of toxic HFC production chemicals	Offsite transfers of toxic HFC production chemicals
Arkema, Inc.	Calvert City	Kentucky	200	843,010	58,043	456	501
Chemours - Corpus Christi Plant	Gregory	Texas	250	17,240	34,876		
Chemours El Dorado	El Dorado	Arkansas	21	66,990	9,868		
Chemours Louisville	Louisville	Kentucky	127	3,707,770	3,724		196
Daikin America	Decatur	Alabama	200	5,297	3,313	22	30
Honeywell - Geismar Complex	Geismar	Louisiana	250	413,584	51,282	499	62,543
Iofina Chemical Inc.	Covington	Kentucky	100	NR			
Mexichem Fluor Inc.	Saint Gabriel	Louisiana	67	18,331	4,369	28	73

Evaluation of 8 HFC Facilities





Community Profile Analysis of 8 HFC Facilities

Proximity analysis characterized communities near 8 HFC facilities.

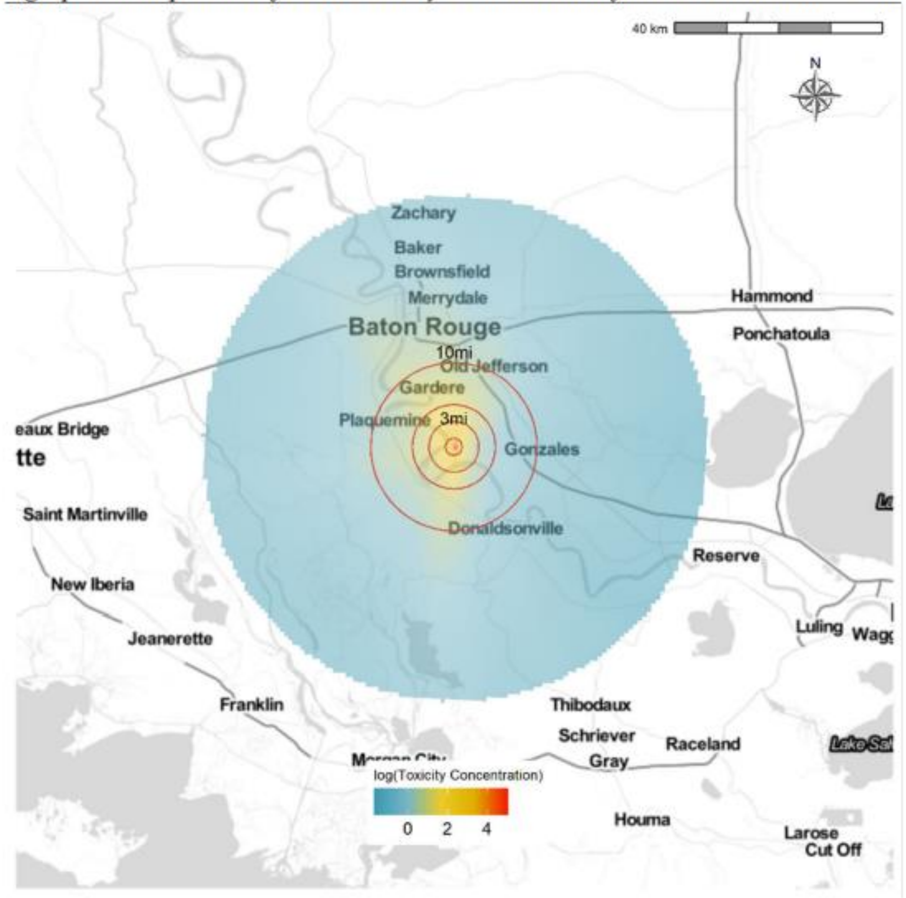
- 1-, 3-, 5- and 10-mile buffers
- Overall and for each facility
- Very high NATA cancer risks around LA facilities
- Not only due to HFC production

	Overall National Average	Rural Areas National Average	Within 1 mile of HFC production facility	Within 3 miles of HFC production facility
% White (race)	72	84	80	65
% Black or African American (race)	13	7.5	16	30
% Other (race)	15	8.2	3.7	4.5
% Hispanic (ethnic origin)	18	10	7.5	6.7
Median Household Income (1k 2019$)	71	67	76	62
% Below Poverty Line	7.3	6.8	5.8	8
% Below Half the Poverty Line	5.8	5.1	6	6.9
Total Cancer Risk (per million)	32	28	53	47
Total Respiratory Risk (hazard quotient)	0.44	0.38	0.66	0.56

Facility Emissions Transport Modelling

Modelled pollution transport modelling for specific facilities with the highest respiratory hazard (link to [Regulatory Impact Analysis]()).

Figure 6-2: Geographical dispersion of RSEI Toxicity Concentration for Mexichem Fluor – Saint Gabriel, LA



AIM Act EJ Analysis Conclusions

Conclusions:

- Baseline cancer and respiratory risks from air toxics vary but are generally higher close to an HFC production facility
- Higher percentages of low-income and Black individuals live near HFC production facilities compared with the overall average at the national level.
- Potential changes in toxic emissions might be unevenly distributed in ways that impact low-income and minority communities differentially.
- Predicting these effects *ex ante* is difficult due to limited information on where and in what quantities specific substitutes will be produced.

Part 3: Retrospective Analyses

Do Environmental Markets Cause Environmental Injustice? Evidence from California's Carbon Market

Danae Hernandez-Cortes & Kyle C. Meng

WORKING PAPER 27205 **DOI** 10.3386/w27205 **ISSUE DATE** May 2020 **REVISION DATE** November 2022

Hernandez-Cortes and Meng (2022)

Research Questions:

1) How did the 2013 introduction of California's carbon market affect emissions of GHGs, PM 2.5, PM 10, NOx, and Sox from C&T regulated facilities?
2) How did the carbon cap and trade system affect disparities in pollution exposure for disadvantaged zip-codes in California?

Methods:

1) Modified difference-in-differences (trend-break model)
2) Pollution transport modelling (HYSPLIT)

Hernandez-Cortes and Meng (2022)

1) How did the 2013 introduction of California's carbon market affect emissions of GHGs, PM 2.5, PM 10, NOx, and Sox from C&T regulated facilities?

$$asinh(Y_{jt}^{p}) = \kappa_1^p[C_j \times t] + \kappa_2^p[C_j \times \mathbf{1}(t \geq 2013) \times t] + \phi_j^p + \gamma_t^p + \nu_{jt}^p$$

Inverse hyperbolic sine transform means point estimates are percentage changes in emissions

Control for differential pre-trends in the treatment group

Change in differential trend after treatment

Facility and year fixed effects

Hernandez-Cortes and Meng (2022)

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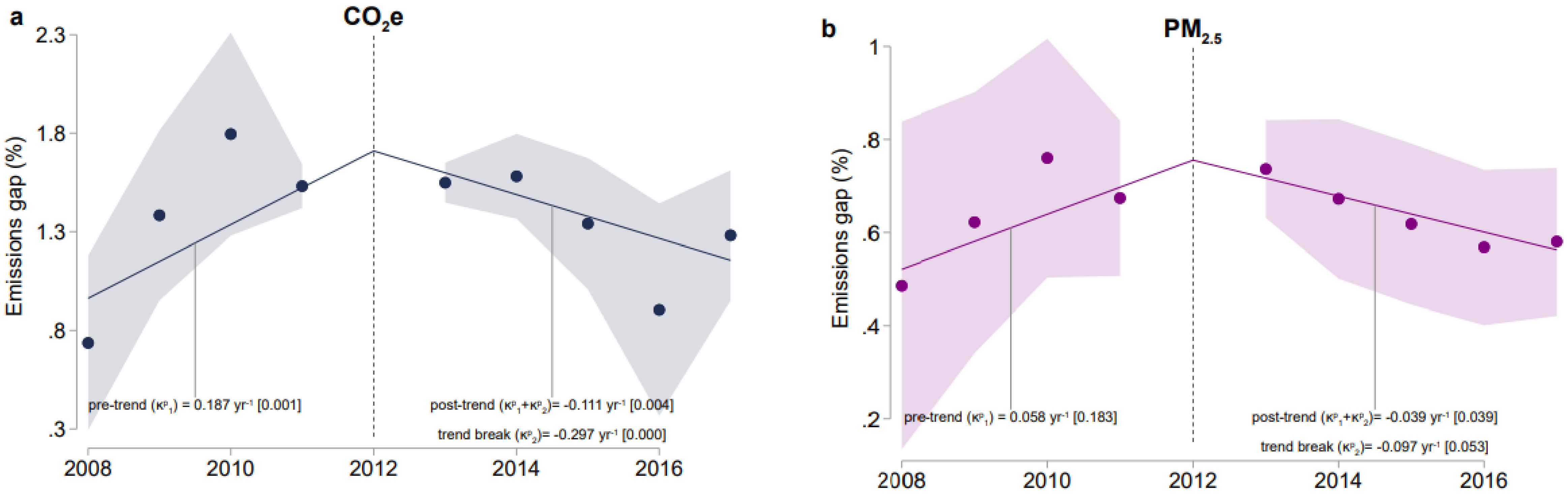
Some explanation:

1) While like a diff-in-diff, this model's use of treatment (C_j) by trend ($\times\ t$) values means that κ_1 is not an average difference in pollution but a trend difference.
2) Since differential pre-trends, κ_1 over-states true impact of the policy. $\kappa_1 + \kappa_2$ is the adjusted change from the policy given differential trends.

Hernandez-Cortes and Meng (2022)



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Hernandez-Cortes and Meng (2022)

Key results to (1):

1) Before policy, gap between CO2e emissions for regulated vs. non-C&T firms was growing by 19 PP each year.
   - Hard to interpret PP. Think of it like going from 130% higher emissions to 149% higher.

	Outcome is (asinh) emissions				
	(1)	(2)	(3)	(4)	(5)
	CO_2e	$PM_{2.5}$	PM_{10}	NO_x	SO_x
pre-trend (κ_1^p)	0.187	0.058	0.083	0.075	0.006
	(0.052)	(0.043)	(0.033)	(0.039)	(0.035)
	[0.001]	[0.183]	[0.016]	[0.061]	[0.875]
trend break (κ_2^p)	-0.297	-0.097	-0.117	-0.104	-0.037
	(0.077)	(0.048)	(0.040)	(0.050)	(0.043)
	[<0.001]	[0.053]	[0.005]	[0.042]	[0.393]
post-trend ($\kappa_1^p + \kappa_2^p$)	-0.111	-0.039	-0.034	-0.029	-0.031
	(0.036)	(0.018)	(0.018)	(0.019)	(0.019)
	[0.004]	[0.039]	[0.068]	[0.138]	[0.109]
2012-2017 annual abatement pct	-8.51	-4.68	-4.15	-2.94	-9.35
2012-2017 total abatement (tons)	-3.2e+06	-97.89	-140.66	-519.94	-62.10
Facilities	316	302	302	303	303
Counties	41	40	40	40	40
Observations	2,054	1,968	1,968	1,970	1,965

Hernandez-Cortes and Meng (2022)

Key results to (1):

2) After policy, gap between CO2e emissions for regulated vs. non-C&T firms was decreasing by 11 PP each year.

- Average annual percent change in emissions.

	Outcome is (asinh) emissions				
	(1)	(2)	(3)	(4)	(5)
	CO_2e	$PM_{2.5}$	PM_{10}	NO_x	SO_x
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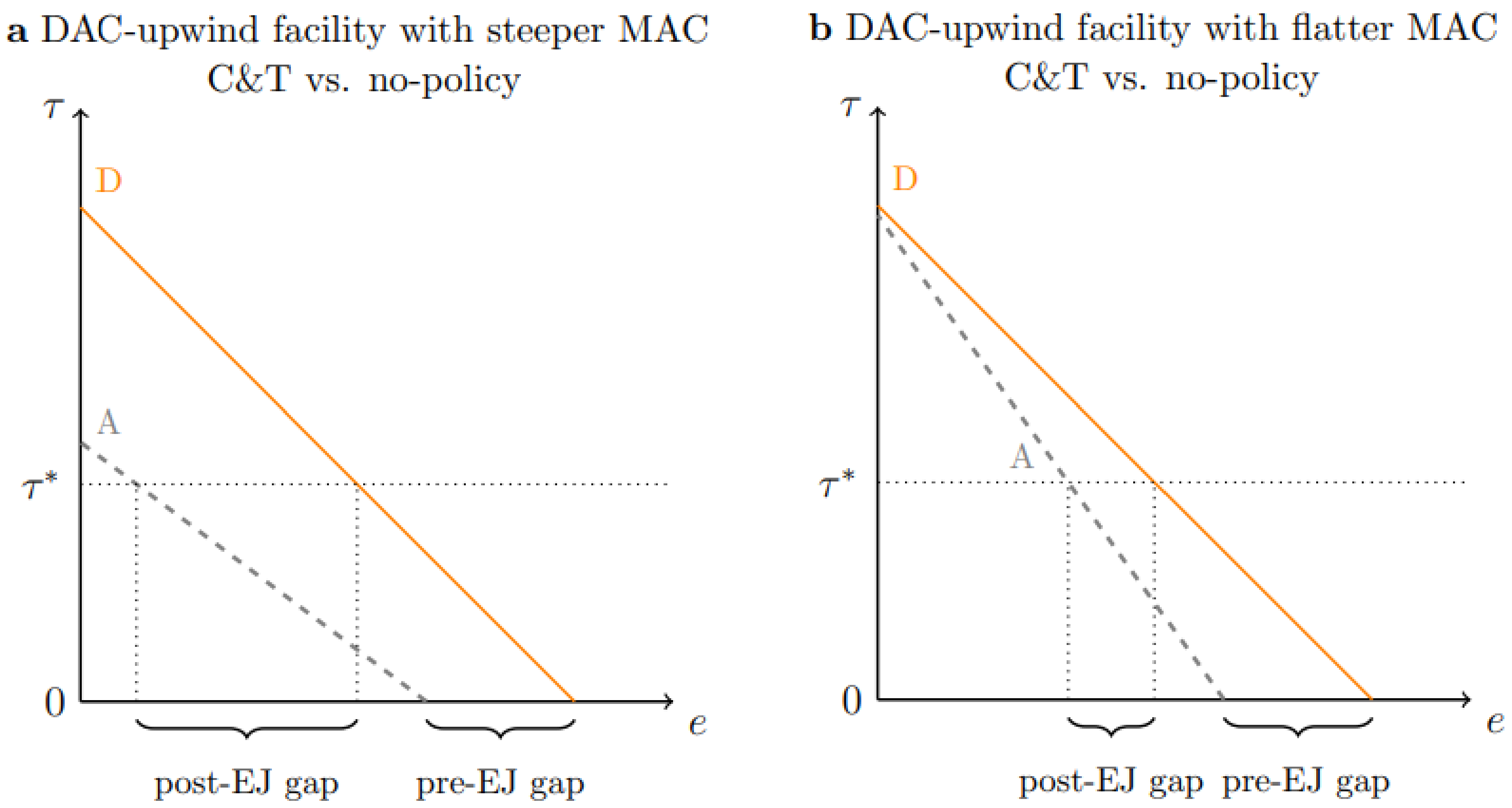
Counties	41	40	40	40	40
Observations	2,054	1,968	1,968	1,970	1,965

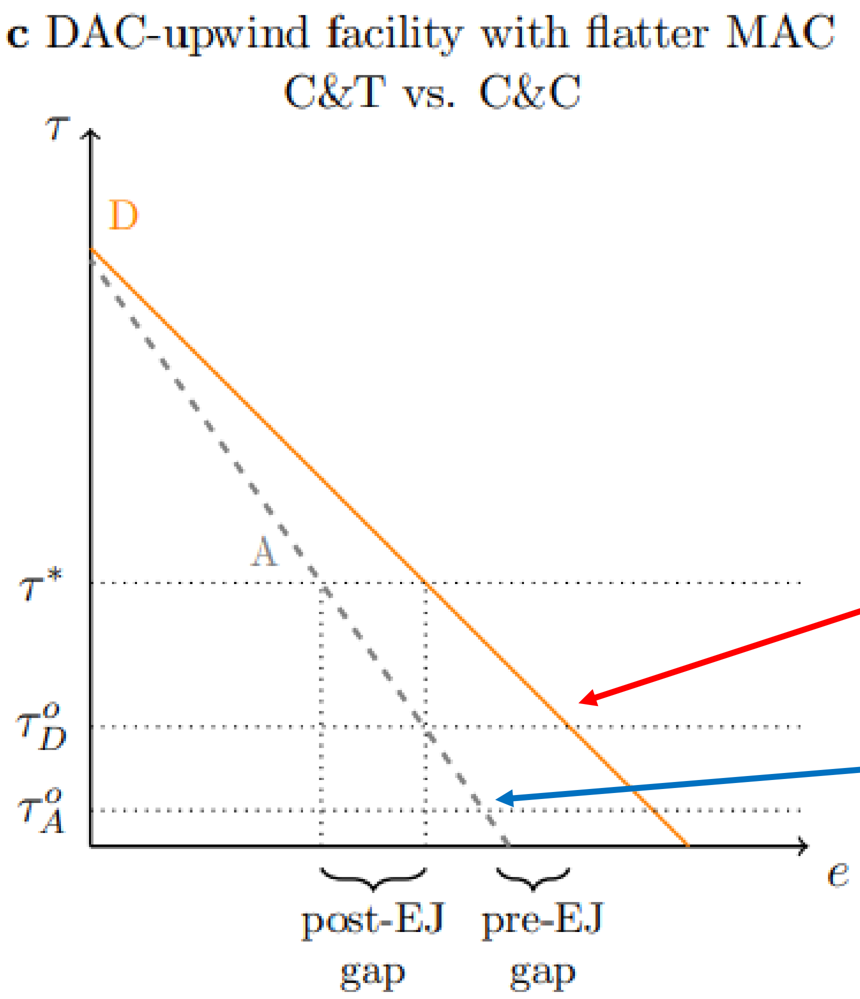
Hernandez-Cortes and Meng (2022)

2) How did the carbon cap and trade system affect disparities in pollution exposure for disadvantaged zip-codes in California?



Hernandez-Cortes and Meng (2022)

What about with pre-existing prescriptive requirements on plants, τ_D and τ_A?



Abatement starting point for D (disadvantaged community) .

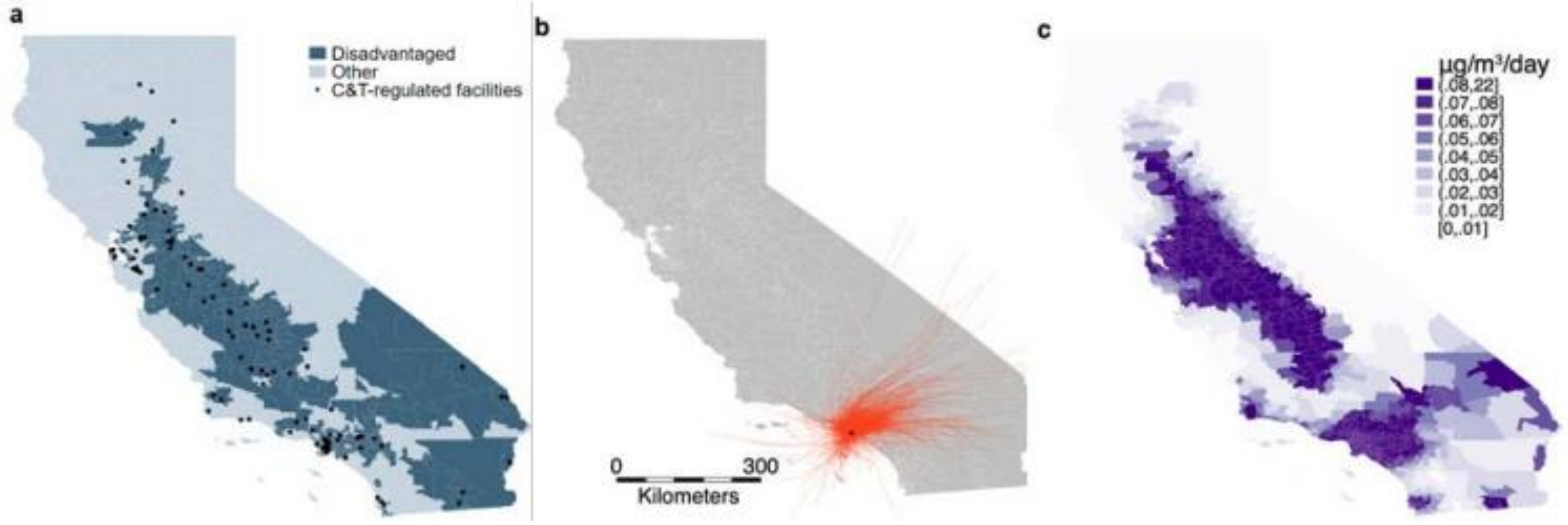
Abatement starting point for A, non-disadvantaged.

Hernandez-Cortes and Meng (2022)

2) How did the carbon cap and trade system affect disparities in pollution exposure for disadvantaged zip-codes in California?

- Need to determine how *emissions* in one location map to *concentrations* elsewhere (moving beyond unit hazard and proximity approaches).
- What is a "*disadvantaged*" community?

Hernandez-Cortes and Meng (2022)

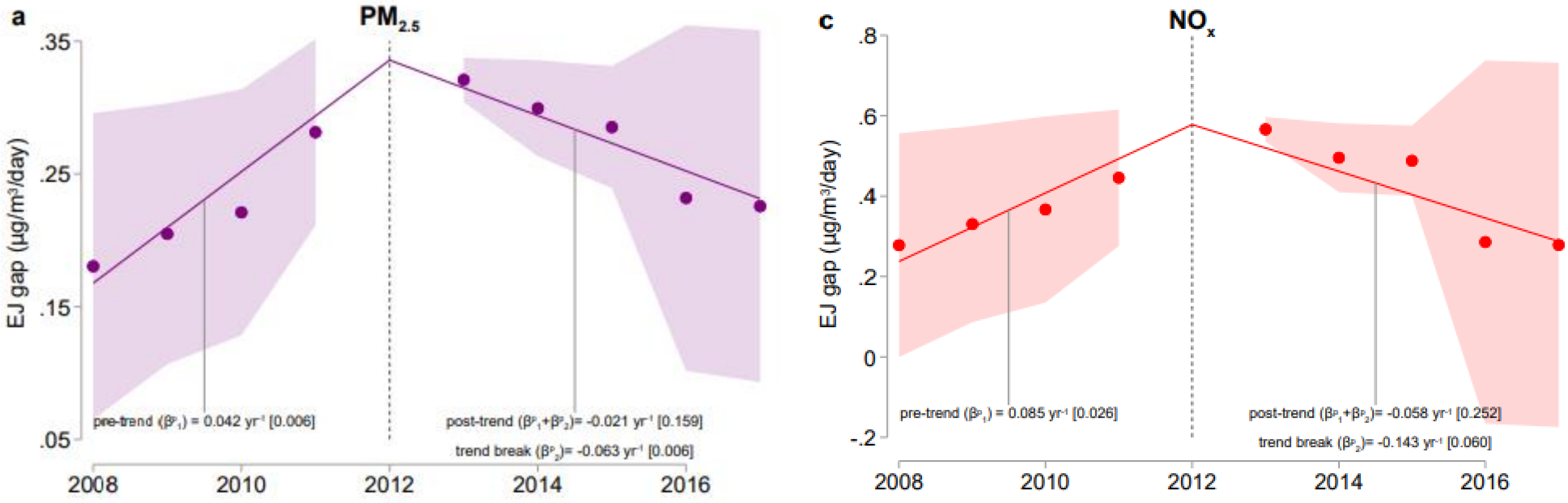


Definition of disadvantaged from CalEnviroScreen.

HYSPLIT model uses plant features, weather, and C&T-driven emissions to model transport.

C&T-facility-driven pollution concentration across zipcodes from HYSPLIT model.

Hernandez-Cortes and Meng (2022)



$$E_{it}^{p} = \beta_1^p[D_i \times t] + \beta_2^p[D_i \times \mathbf{1}(t \geq 2013) \times t] + \psi_i^p + \delta_t^p + \epsilon_{it}^p$$

Hernandez-Cortes and Meng (2022)

Key results to (2):

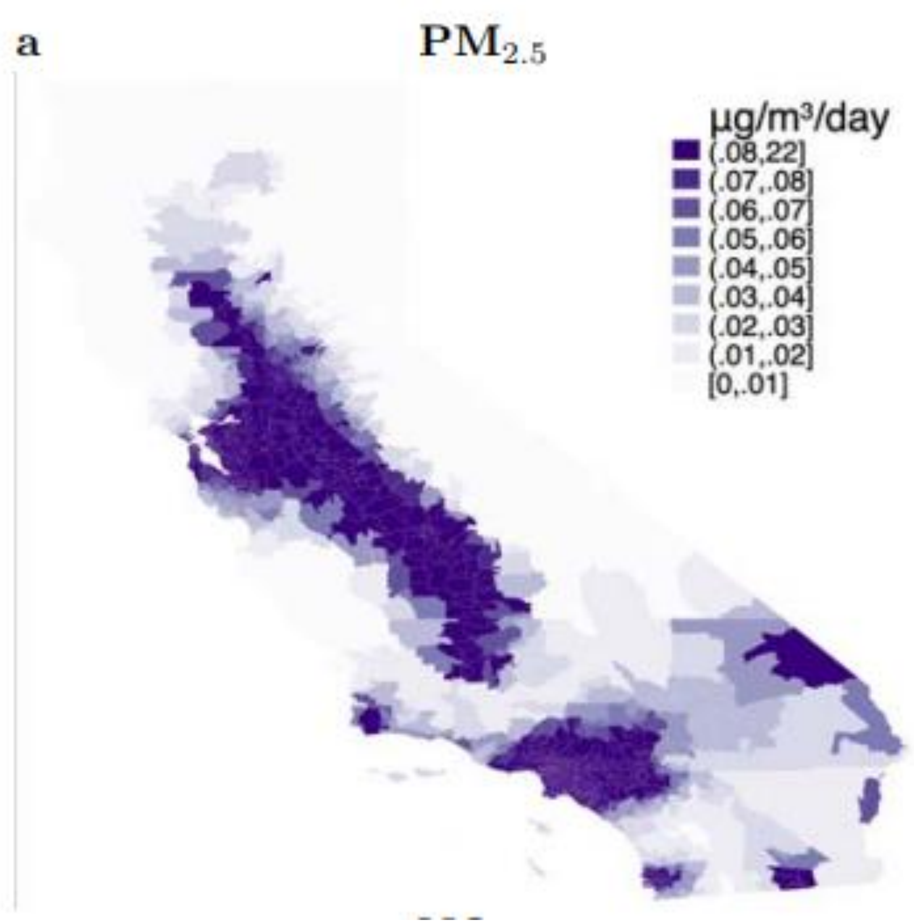
1) Before policy, EJ gap from C&T regulated facilities was widening.

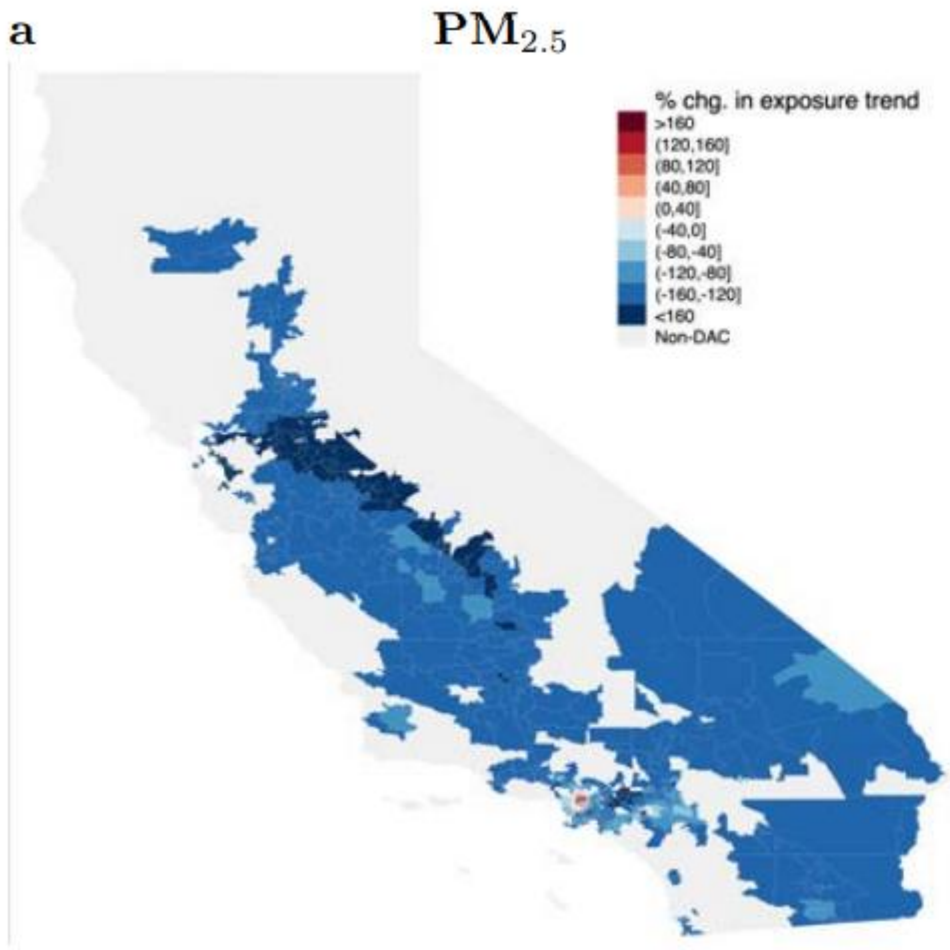
2) After policy, facilities subject to regulation released emissions that caused EJ gaps to narrow by 6-10% annually.

Table 2: Trend break in the environmental justice gap

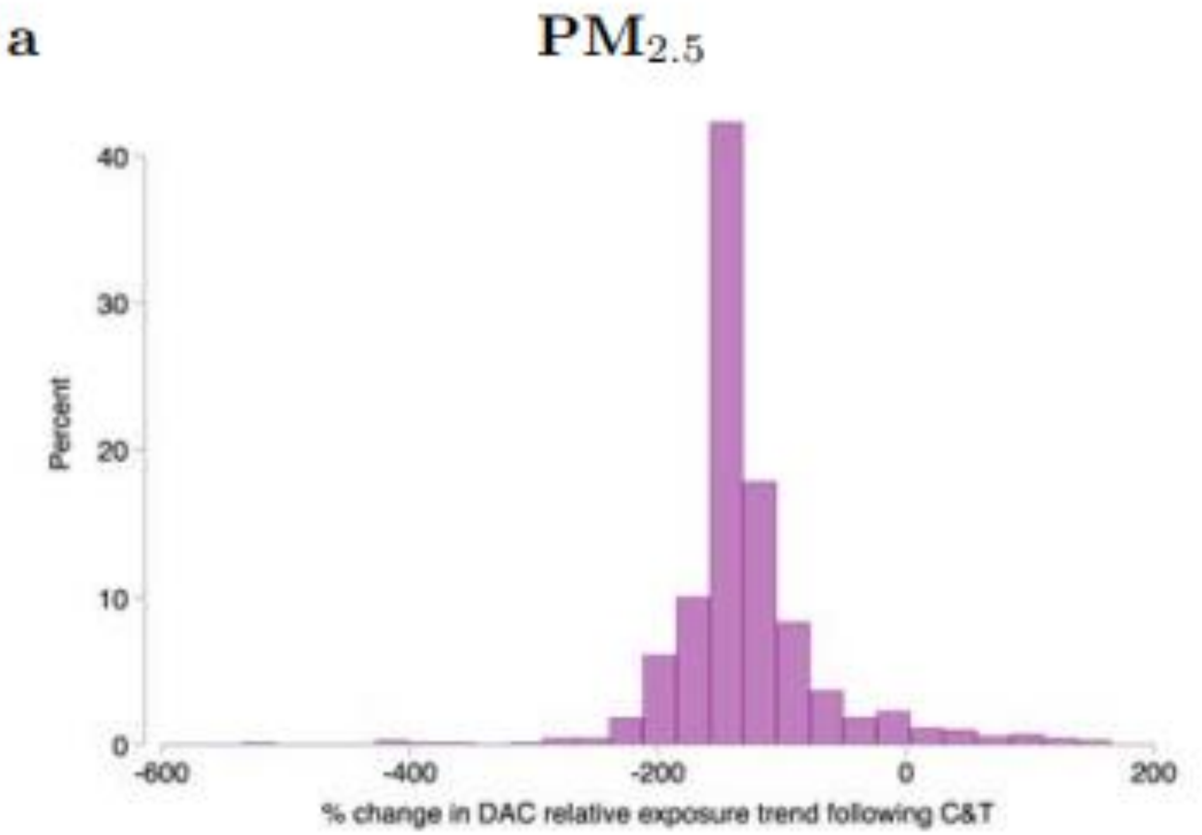
	(1) $PM_{2.5}$	(2) PM_{10}	(3) NO_x	(4) SO_x
pre-trend (β_1^p)	0.042	0.065	0.085	0.037
	(0.015)	(0.017)	(0.037)	(0.025)
	[0.006]	[<0.001]	[0.026]	[0.151]
trend break (β_2^p)	-0.063	-0.090	-0.143	-0.101
	(0.022)	(0.029)	(0.074)	(0.051)
	[0.006]	[0.003]	[0.060]	[0.053]
post-trend ($\beta_1^p + \beta_2^p$)	-0.021	-0.026	-0.058	-0.064
	(0.015)	(0.020)	(0.050)	(0.027)
	[0.159]	[0.203]	[0.252]	[0.024]
Trend pct change ($100 * \beta_2^p/\beta_1^p$)	-149.699	-139.739	-168.282	-272.291
	(36.369)	(29.971)	(53.377)	(66.044)
	[<0.001]	[<0.001]	[0.002]	[<0.001]
2012-2017 annual EJ gap change pct	-6.57	-5.78	-10.15	-17.01
Zip codes	1649	1649	1649	1649
Counties	58	58	58	58
Observations	16,416	16,416	16,416	16,416

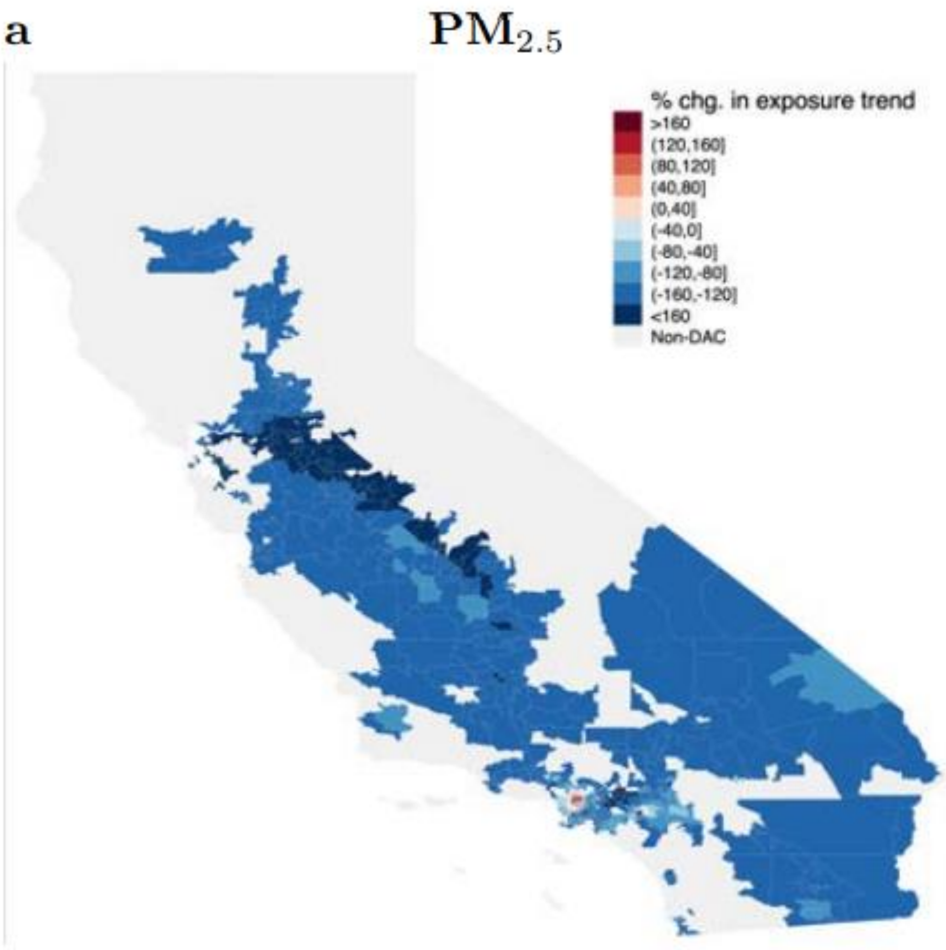
Hernandez-Cortes and Meng (2022)





Hernandez-Cortes and Meng (2022)



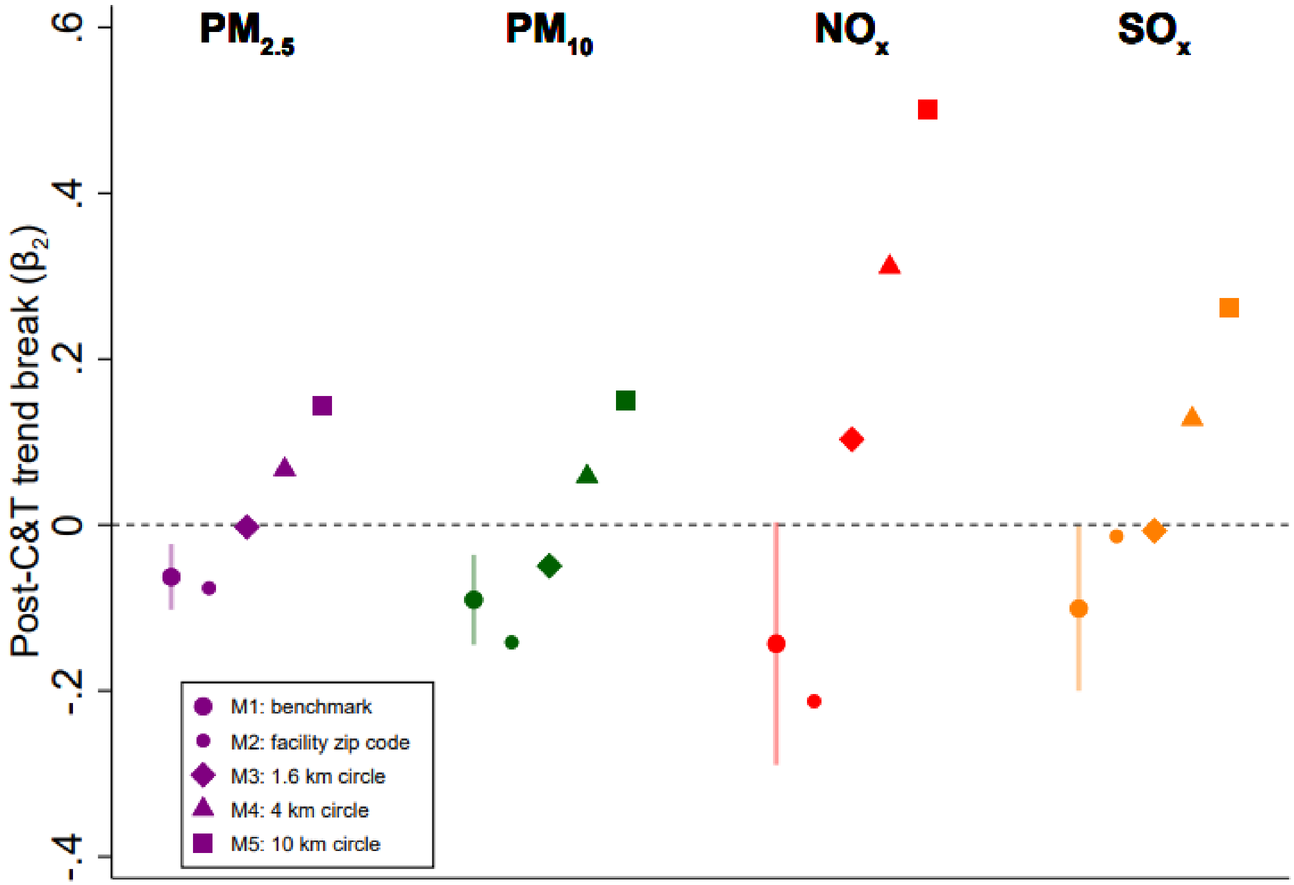


[Hernandez-Cortes and Meng (2022)]

Final point:

Fate and transport modelling really affected their results.

Using just facility locations or buffering circles would have led to the opposite conclusion.



Controversy

Hernandez-Cortes and Meng (2022) was *very* controversial when a prior version in 2020 was released.

Danny Cullenwald and Katie Valenzuela's response in 2020.

A critique of "Do Environmental Markets Cause Environmental Injustice? Evidence from California's Carbon Market," a 2020 NBER working paper by Danae Hernández-Cortés and Kyle C. Meng

DECEMBER 01, 2020 BY DANNY CULLENWARD

When this working paper was released, it was our ardent hope that the technical flaws and clear research bias would prevent it from being used to inform deliberations on climate policy. As time has passed, however, and it has become apparent that this paper is being used to undermine legitimate critiques of carbon pricing programs like California's cap-and-trade program, we feel it is our responsibility to highlight the errors in method and assumptions present in this paper.

Cullenwald's Critique

Five errors highlighted:

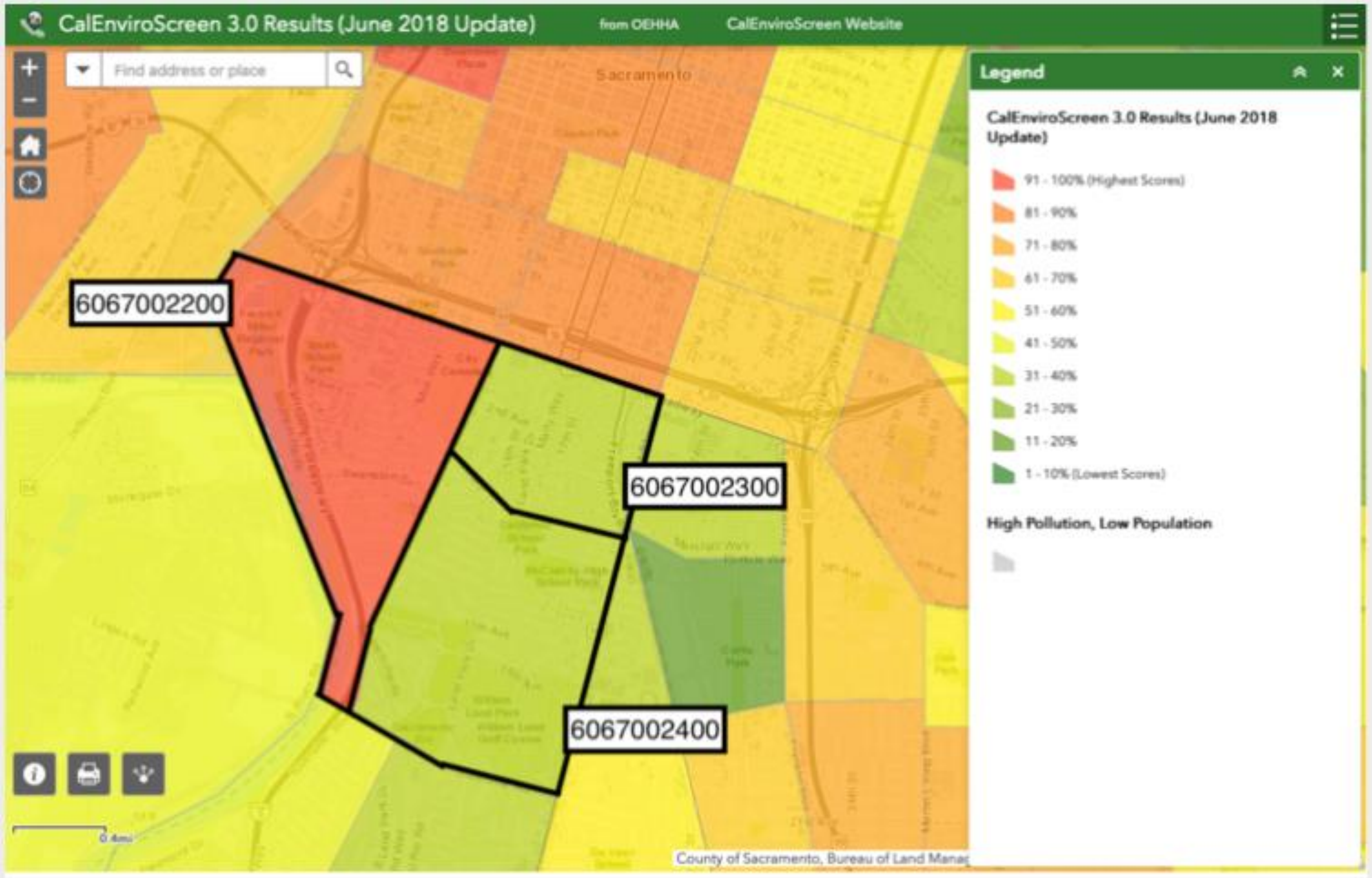
1) Inaccurate definition of environmental justice communities
2) Data quality issues with emissions reporting and monitoring
3) Control group bias
4) Omitted variable bias
5) The question is not cap-and-trade vs. nothing

Image source.

Cullenwald's Critique

1) Inaccurate definition of environmental justice communities

- Zipcode vs. neighborhood



Cullenwald's Critique

2) Data quality issues with emissions reporting and monitoring

- ambient pollution at any location is composed of emissions originating from many sources

Table S2: Correlation between HYSPLIT-driven and ambient pollution exposure

	(1)	(2)	(3)	(4)
	Outcome is ambient ln exposure			
	ln NO_x	ln SO_x	ln $PM_{2.5}$	ln PM_{10}
HYSPLIT-driven ln exposure	0.16***	0.09	0.09***	0.09***
	[0.03]	[0.07]	[0.03]	[0.02]
Zip codes	95	32	86	94

2020 paper.

Table S5: Correlation between HYSPLIT-driven and ambient pollution concentrations

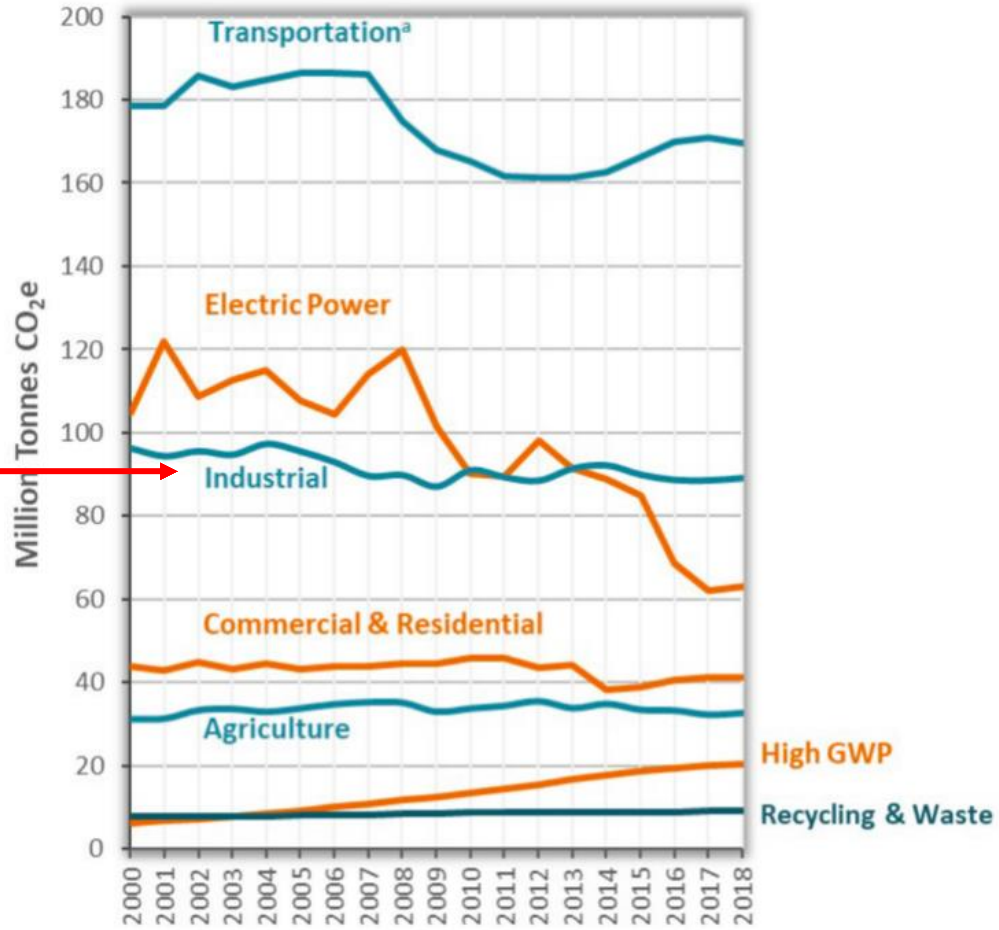
	(1)	(2)	(3)	(4)
	Outcome is ambient asinh(concentration)			
	$PM_{2.5}$	PM_{10}	NO_x	SO_x
HYSPLIT-driven asinh(concentration)	0.860	0.625	0.436	0.231
	(0.154)	(0.137)	(0.148)	(0.207)
	[<0.001]	[<0.001]	[0.004]	[0.272]
Zip codes	133	160	121	39

2022 paper.

Cullenwald’s Critique

2) Data quality issues with emissions reporting and monitoring

Also California’s own data and Cullenwald’s prior research shows industrial emissions not improving for industrial sources.



Cullenwald's Critique

3) Control Group Bias

Trend-break model controlling for differential trends helps.

Facilities over 75th percentile of GHG emissions dropped.

Table S1: GHG cap-and-trade regulated and non-regulated facilities

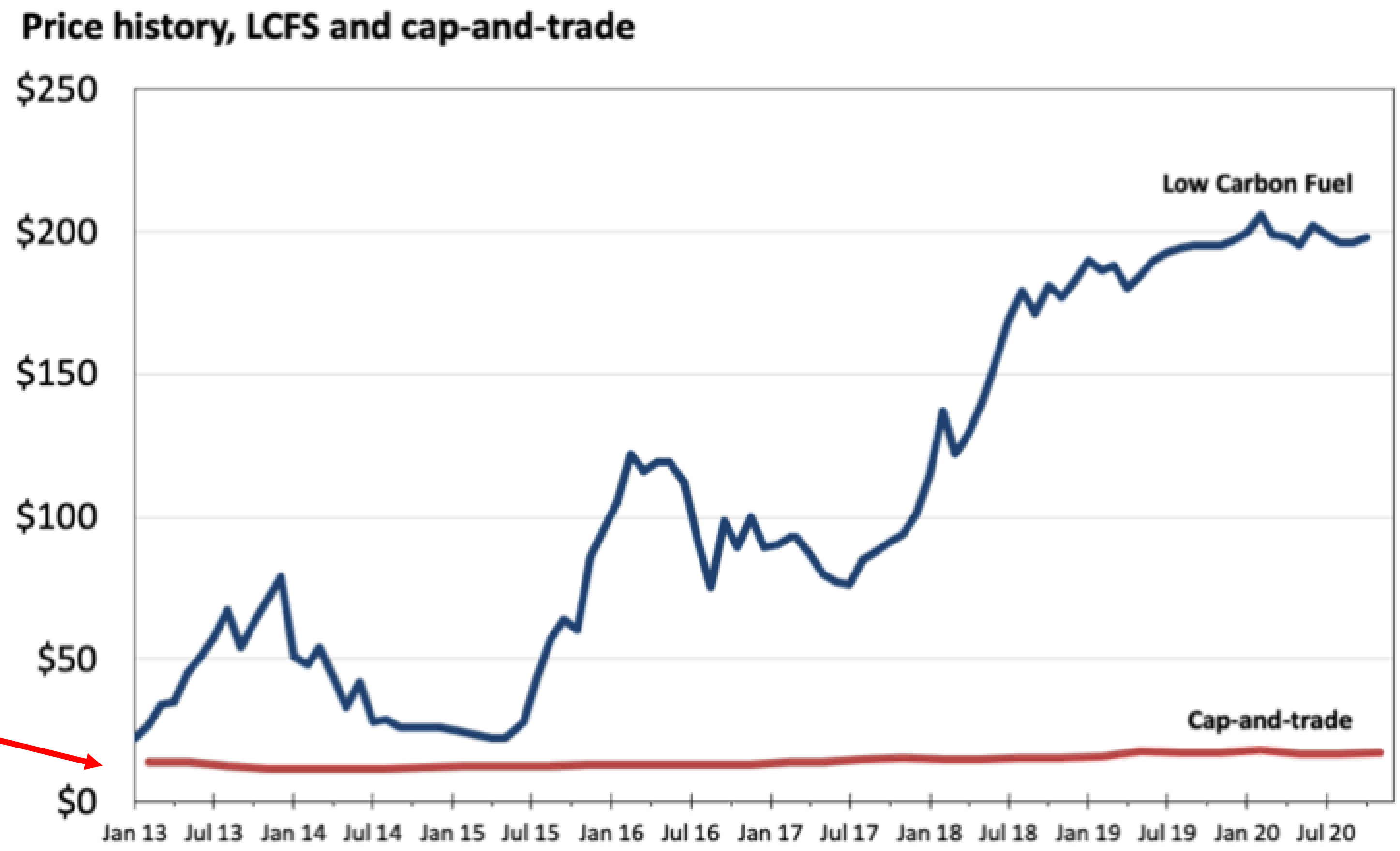
	C&T regulated facilities	non-C&T regulated facilities
Number of facilities	106	226
Avg. 2008-2012 emissions (in metric tons):		
CO_2	38192.62	17566.48
PM_{10}	14.48	6.25
$PM_{2.5}$	8.02	3.74
NO_x	53.42	16.03
SO_x	10.86	2.8
Shares by sector:		
Agriculture	0	.018
Manufacturing	.623	.504
Mining, Oil and Gas extraction	.16	.097
Services	.066	.23
Transportation	.066	.053
Utilities	.075	.093
Wholesale	.009	.004

Cullenwald's Critique

4) Omitted variable bias

Low carbon fuel standards are also a cap and trade at the same time. LCFS prices increased rapidly at the same time as the carbon cap and trade.

Carbon price not generally binding.



Cullenwald's Critique

5) The question is not cap-and-trade vs. nothing. Argues for:

1. Stronger cap and trade with fewer allowances
2. More prescriptive regulations on releasers
3. More of both policies

"It's not news that a flawed program is better than no program at all, but that's all the paper looks at."

Two Perspectives

Adopting a weak cap-and-trade program has led to prolonged and higher emissions in environmental justice communities than if California had adopted a stringent carbon pricing policy or relied instead on non-market mechanisms that would have been targeted at the pollution reductions our communities need.

- Cullenwald

More generally, despite these findings for California, market-based environmental policies should not be used explicitly to address environmental justice concerns. Market-based policies are intended for allocative efficiency and not distributional objectives… environmental justice problems need environmental justice policies.

- Hernandez-Cortes and Meng

A Response to Cullenwald

!!!

Crocker, T. 1966. "The structuring of atmospheric pollution control systems. The economics of air pollution." *The economics of air pollution. New York, WW Norton & Co*, 61–86.

Cummiskey, Kevin, Chanmin Kim, Christine Choirat, Lucas R. F. Henneman, Joel Schwartz, and Corwin Zigler. 2019. "A Source-Oriented Approach to Coal Power Plant Emissions Health Effects."

Currie, Janet, John Voorheis, and Reed Walker. 2020. "What Caused Racial Disparities in Particulate Exposure to Fall? New Evidence from the Clean Air Act and Satellite-Based Measures of Air Quality." National Bureau of Economic Research Working Paper 26659.

Next class

Have a nice weekend. Your fourth case study will be ready later this week. The deadline will be postponed accordingly.

Next Monday we'll spend more time talking about real implications of environmental policies. Your readings:

- K&O Chapter 10
- Borenstein and Kellogg (2022)