

Harnessing Market Forces to Protect the Climate

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May 15, 2014*

“What business are you in?”



“I’m an environmental economist.”

“Environmental economics” is *not* oxymoronic.

1. The *causes* of environmental problems (in a market economy) are economic – unintended side-effects of market activity (“externalities”).
 2. The *consequences* of environmental problems have important economic dimensions.
- Therefore, an economic perspective is *essential* for
 - *Understanding* environmental problems
 - And therefore can be *exceptionally helpful* for the design of *solutions* that will be *effective, economically sensible, and politically pragmatic*.
 - Economic thinking is particularly important for the formulation of effective, sensible, and politically feasible **climate policies** ...

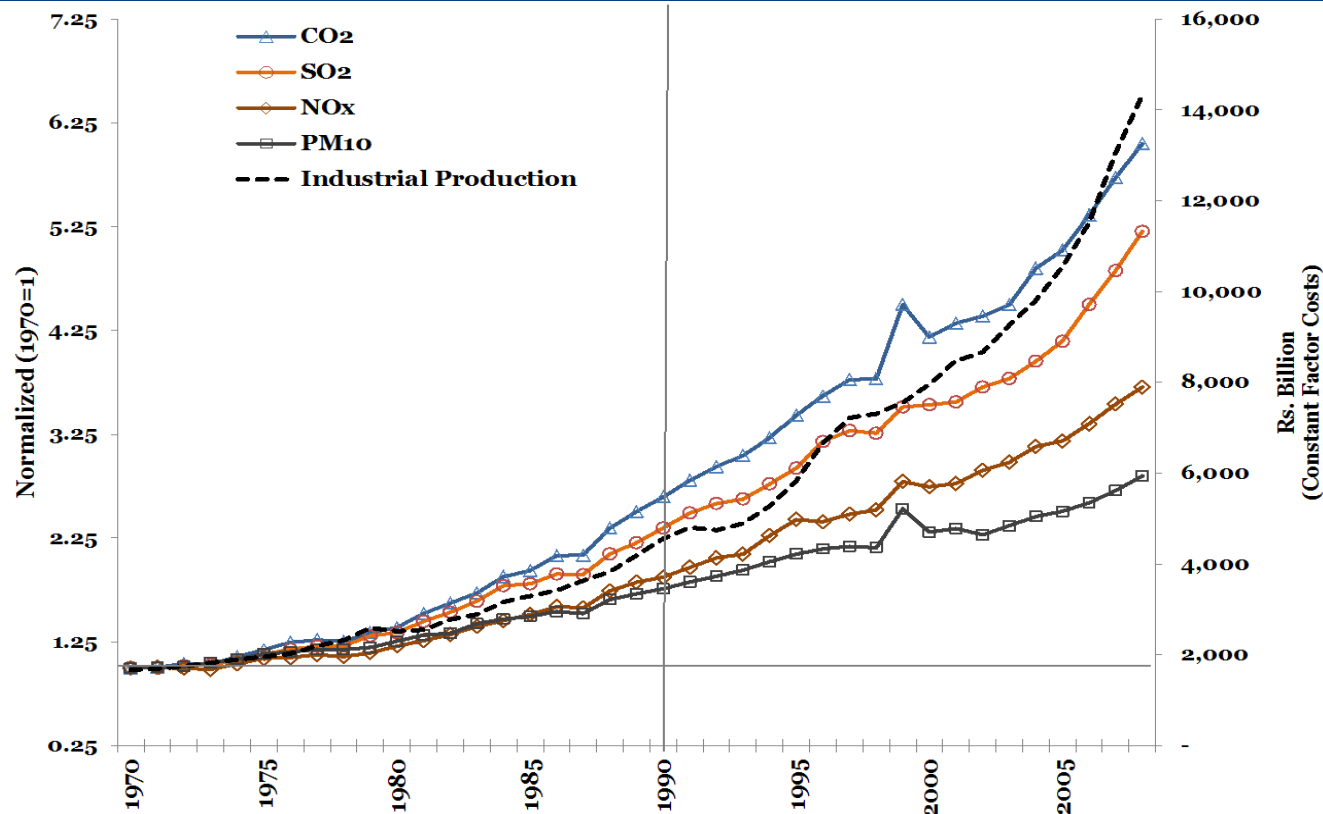
Science → Economics → Geopolitics of Climate Change

- Greenhouse gases *mix in the atmosphere*, so the location of emissions has *no effect on impacts* – In economic terms, climate change is a *global commons problem*
 - Any jurisdiction taking action – a country, province, or city – incurs the costs of its actions
 - But direct benefits (averted climate change) are distributed globally
 - Therefore, for virtually any jurisdiction, the direct benefits it reaps from its actions will be *less* than the direct costs it incurs
 - despite the fact that the global benefits may be *greater* – possibly *much* greater – than the global costs
- This presents a classic free-rider problem,
 - which is why *international*, if not global, cooperation will be essential,
 - And why the *highest levels* of effective governance need to be engaged, that is, *national governments* ...

Thinking About
Emerging Economies:
The Case of India

Growth and emissions: the Indian case

CO₂, Criteria Pollutant Emission & Industrial Production India (1970 – 2008)



Source: Compiled from Emission Database for Global Atmospheric Research (EDGAR v4.2)
European Commission Joint Research Center. Industrial production data from Reserve Bank of India.

Emerging economies like India are not using frontier regulatory tools

- One reason is limited ability to obtain credible information on industrial plant and citizens
 - Low staff
 - Private sector solutions often don't work

“Verifiers, which are supposed to provide independent audits on how much carbon a project actually reduced, will be under increased pressure to inflate their figures... In the same way that credit rating agencies both designed complex mortgage-backed securities and also rated them, some carbon consulting firms provide both project development consulting and verification services, which creates a conflict of interest.”

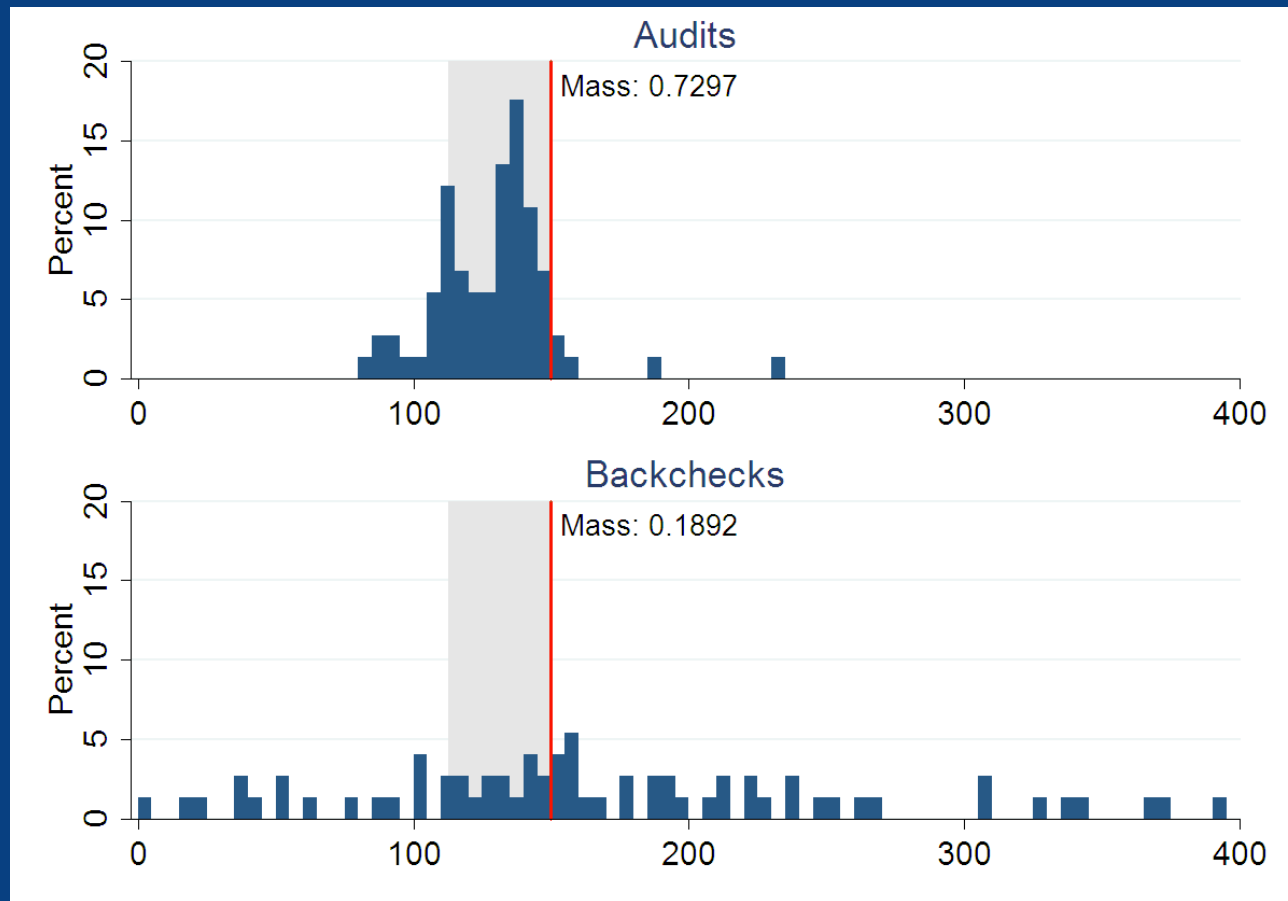
- Friends of the Earth

From problem diagnosis to policy design

- Together with environmental regulator in Gujarat India evaluates at scale a reform to their audit program.
 - ① Design policy which cuts financial link between auditor and company being audited
 - ② Evaluate policy impact using large scale field experiment (500 plants) to get rigorous causal evidence

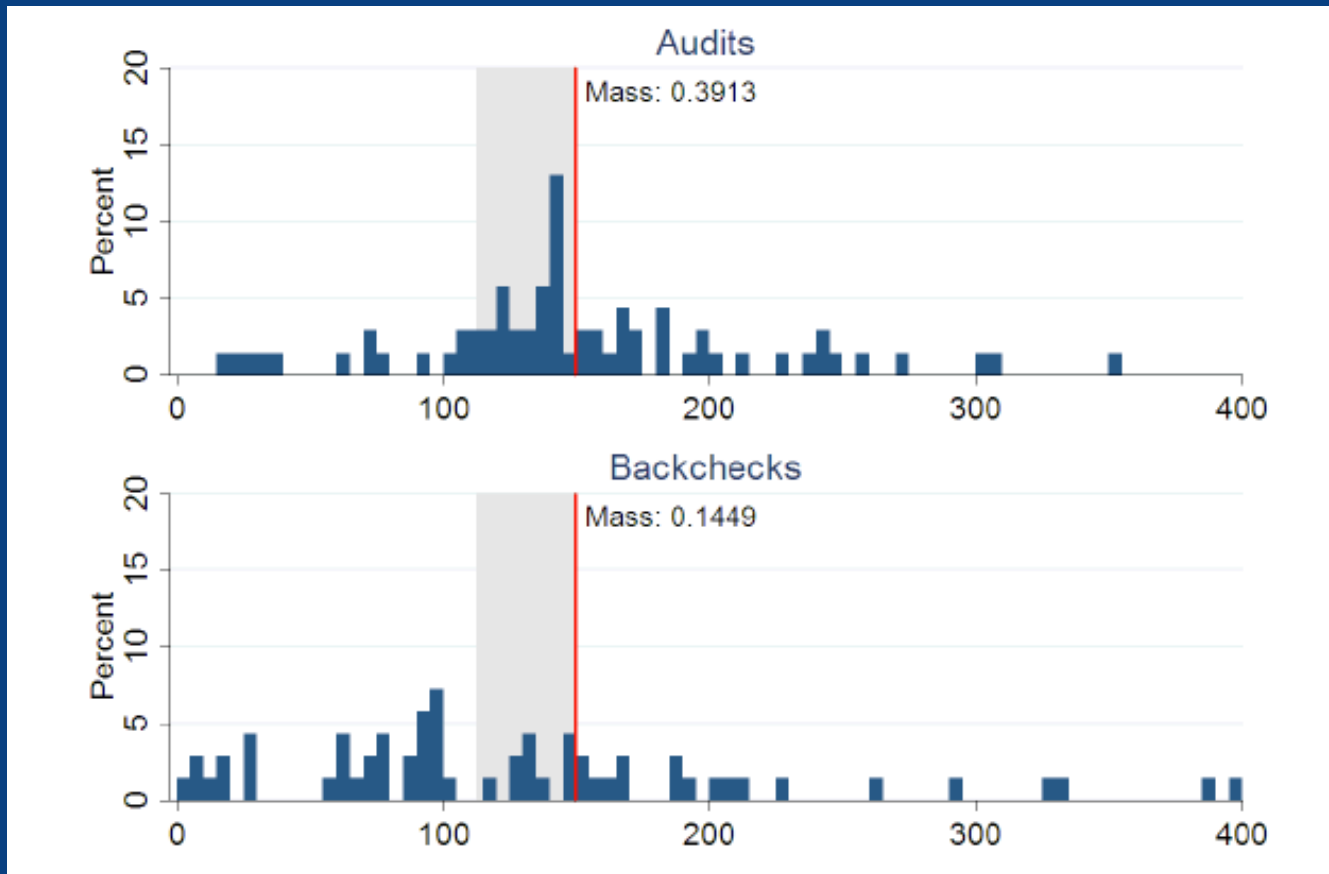
I. Reporting was corrupt under status quo

Control Group: Readings for Suspended Particular Matter (mg/Nm³)



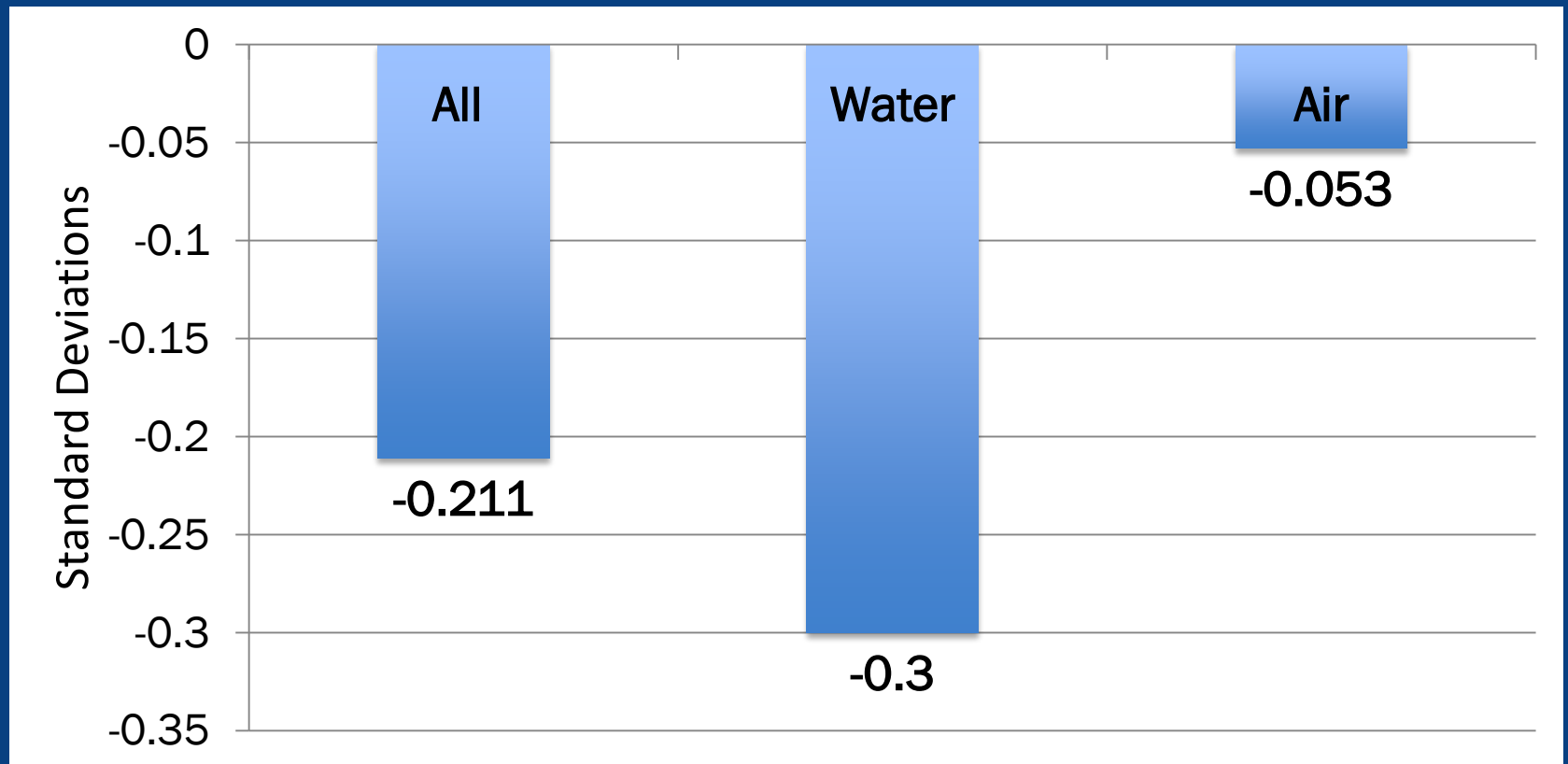
II. Treatment caused the auditors to become more truthful

Treatment Group: Readings for Suspended Particular Matter (mg/Nm³)



III: Treatment caused plants to reduce pollution

Impact of New Audit System on Pollution



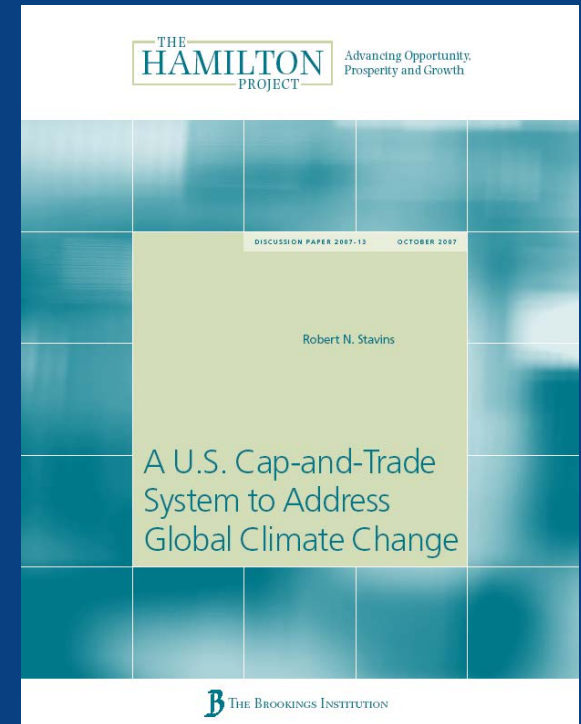
Thinking About Climate Change Policy

Most policy analysts favor national *carbon-pricing*. *Why?*

- No other feasible approach can provide meaningful emissions reductions (such as U.S. target of 83% cut in CO₂ emissions below 2005 by 2050)
- Least costly approach in short term (heterogeneous abatement costs)
- Least costly approach in the long term (incentive for carbon-friendly technological change)
- Most policies have favored cap-and-trade over carbon taxes ...

Cap-and-Trade

- Can provide *cost-effective* means of achieving *meaningful* emissions reductions
- Offers *easy means of compensating* for inevitably *unequal burdens* imposed by a climate policy
- *Less likely to be degraded* – in terms of *environmental performance and cost-effectiveness* – by *political forces*
- Provides *straightforward means to link* with other countries' climate policies
- Has a *history of successful adoption and implementation* over two decades ...



Experience with Cap-and-Trade Policies

- Leded Gasoline Phasedown (1982-1987)
- SO₂ Allowance Trading, CAAA of 1990 (1995-2010)
- European Union Emissions Trading System (2008-2020)
- Regional Greenhouse Gas Initiative, RGGI (2009-2019)
- *California's AB-32 GHG Cap-and-Trade System (2013-2020)*

California's Global Warming Solutions Act (2006, AB 32)

- Broad, ambitious policy to cut GHG emissions to 1990 level by 2020
 - Energy efficiency standards for vehicles, buildings, & appliances
 - Renewable portfolio standard (increases from 20% to 33%)
 - Low carbon fuel standard
 - *Cap-and-trade system ...*
 - Cap covers 85% of economy, *declines* from 2012 through 2020
 - Increasing use of *auctions* over time
 - *Price collar* creates essentially a *hybrid of cap-and-trade and tax*
 - Provides protection for *trade-sensitive industries*

California's AB 32 Cap-and-Trade System – Lessons

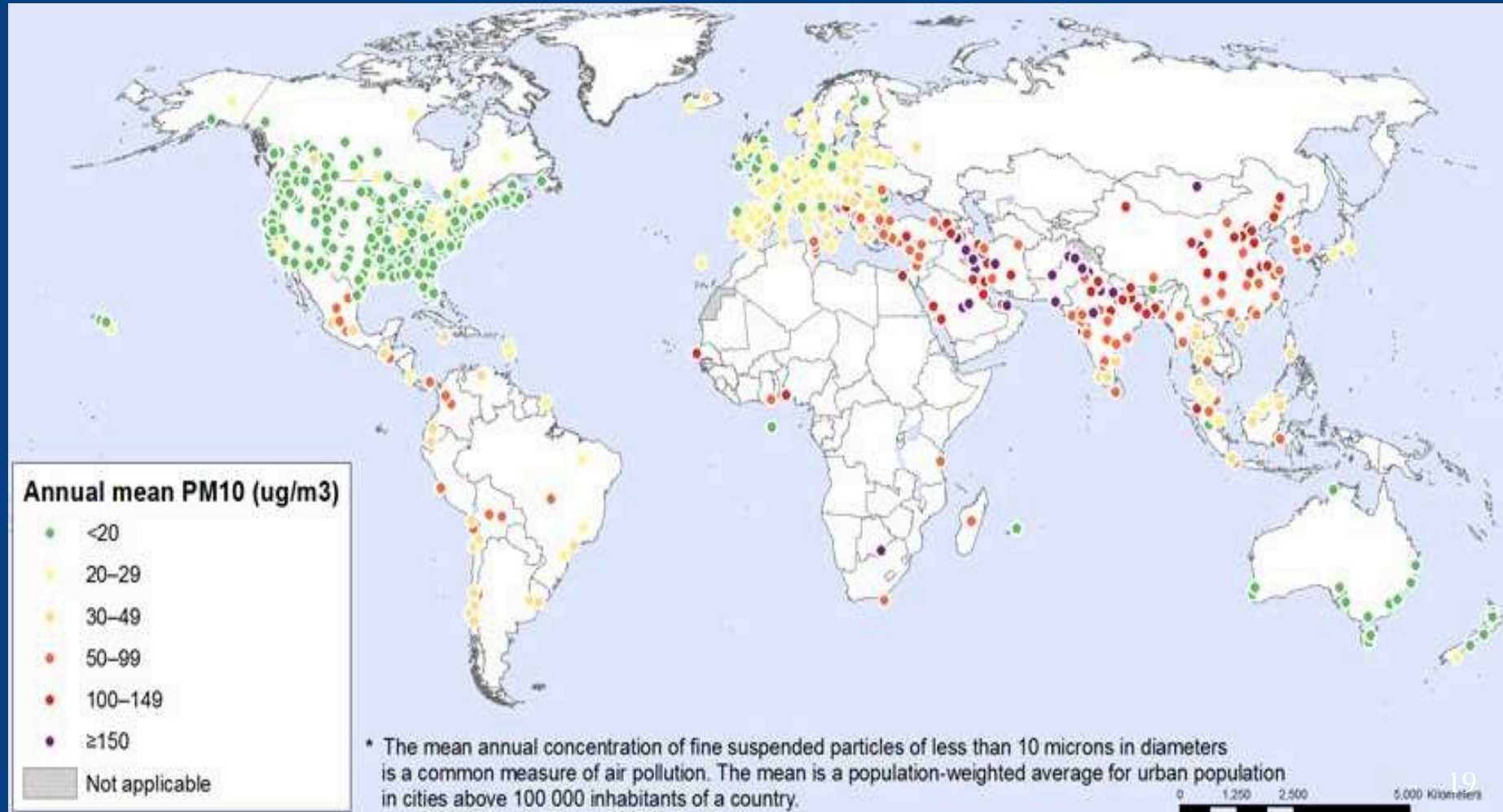
- Carbon pricing is necessary, but *not* sufficient, due to other market failures
 - Examples include basic R&D and principal-agent problem (buildings)
 - So, specific non-pricing policies *can be* complementary
- But some “complementary policies” *conflict* rather than complement!
 - *California example* – Low Carbon Fuel Standard, Renewable Electricity Standards
 - *Consequences* of policy for sources *under the cap* of a cap-and-trade system
 - *Achieves no incremental CO₂ emission reductions* –relocates emissions
 - *Drives up abatement costs* (marginal costs not equated)
 - *Suppresses allowance price* (by reducing overall demand for allowances)
 - With carbon taxes, other policies *can achieve* additional reductions (but not c/e)
 - As long as cap-and-trade is employed, many so-called “complementary policies” are *nothing of the kind!* (Also a major problem with European suite of policies)

California's AB 32 Cap-and-Trade System – More Lessons

- Initial free allocation *fostered political support*
- Economy-wide system *feasible*, and *much more effective* than sectoral system
- Price collar *effective*
- Free allocation *per se* does *not* affect leakage/competitiveness (inframarginal)
 - So, *attempts* at competitiveness protection under EU ETS are *ineffective*
 - But *output-based updating* system makes allocations *marginal*
 - So, in California system, this *reduces competitiveness and leakage risks* for trade-sensitive sectors
 - But leakage risks remain for electricity sector, due to *contract reshuffling*
 - Ultimately, *only way to eliminate* leakage/competitiveness risk is through broader (national & international) coalition of action ...

Creating cap-and-trade markets
in emerging economies:
The Indian Case Continued

Identify policy demand: dangerously high PM levels across Asia



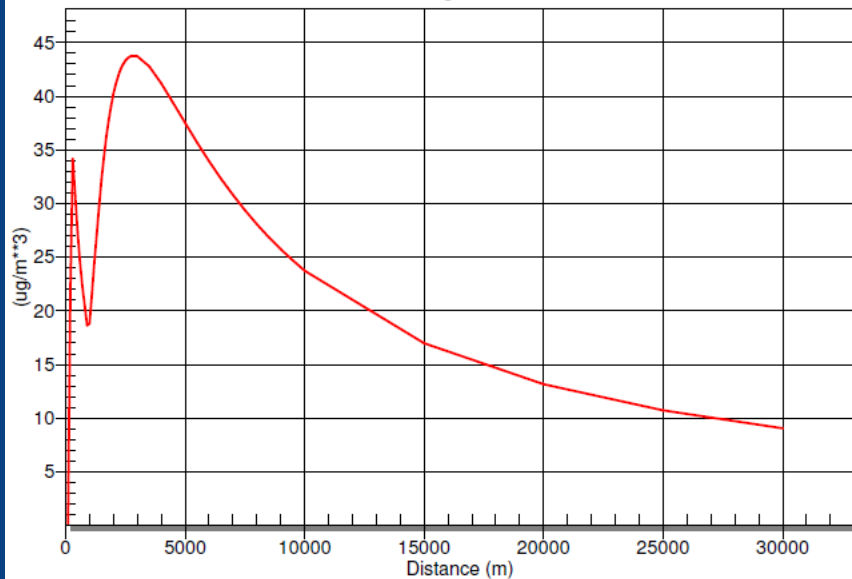
Air pollution causes shorter and sicker lives

- Air pollution has become the world's single biggest environmental health risk, linked to around 7 million – or nearly one in eight deaths in 2012- according to the World Health Organization (The Guardian 2014)
- New data reveals a stronger link between both indoor and outdoor air pollution exposure and cardiovascular diseases, such as strokes and ischaemic heart disease, as well as between air pollution and cancer. This is in addition to air pollution's role in the development of respiratory diseases (WHO 2014)

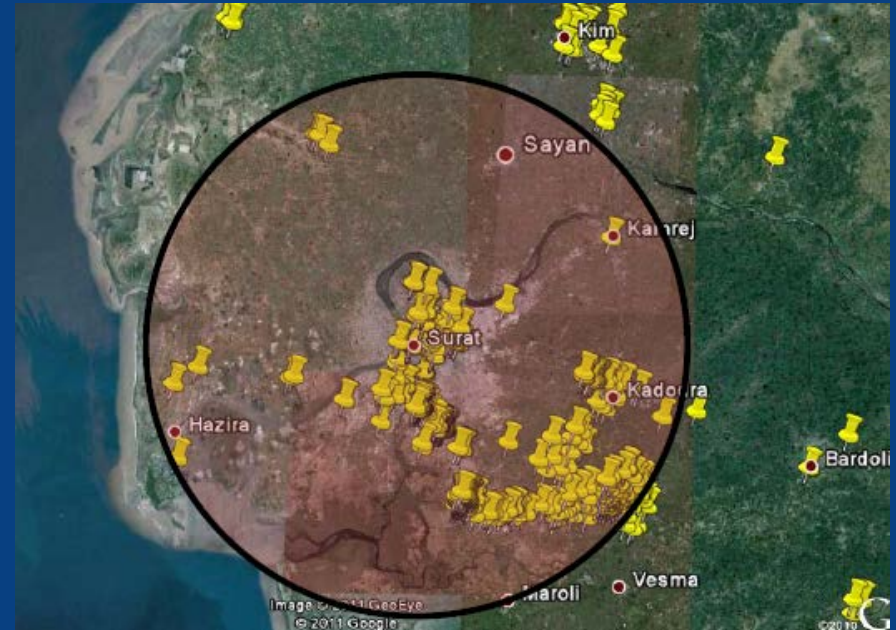
Develop cap and trade that targets industrial point sources close to population centers

Dispersion of Particulates with Distance

Automated Distance Vs. Concentration
Terrain Height = 0.00 m.



Surat : Pop. 5 million



Ensure credible information: National guidelines for continuous emissions monitoring



Ensure rigorous evidence to guide next policy decisions: pilot CEMS and Cap and Trade program to be evaluated as part of a single research program

**Firms Phased into
Different Groups
(Random Assignment)**

**Research
Question**

<i>Period 1</i>	CEMS		No CEMS		<i>Measure the effect of continuous emissions monitoring</i>
<i>Period 2</i>	CEMS		CEMS		
<i>Period 3</i>	Trading	No Trading	Trading	No Trading	<i>Measure the effect of market-based regulation; All Plants Move to Load-Based Standard</i>

Thank You!

For More Information

Harvard Project on Climate Agreements

www.belfercenter.org/climate

Harvard Environmental Economics Program

www.hks.harvard.edu/m-rcbg/heap/

Evidence for Policy Design (EPoD)

www.epod.cid.harvard.edu/

Harvard Sustainability Sciences Program

<http://www.hks.harvard.edu/centers/mrcbg/programs/sustsci>

Blog – An Economic View of the Environment

www.robertstavinsblog.org/

www.hks.harvard.edu/fs/rpande

www.stavins.com