Public Health Impacts of Energy Use: Seeking Climate and Air Pollution Co-Benefits

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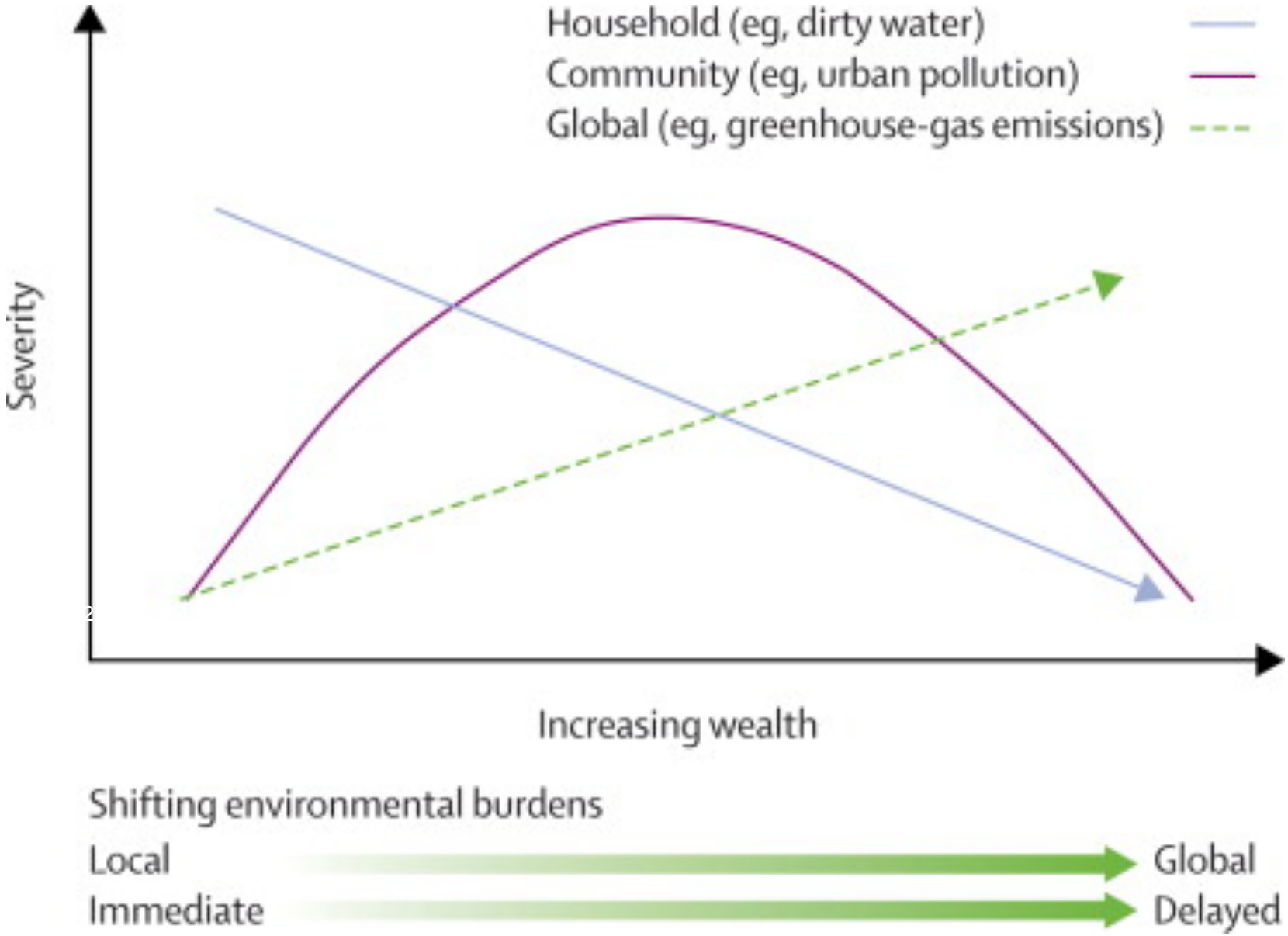
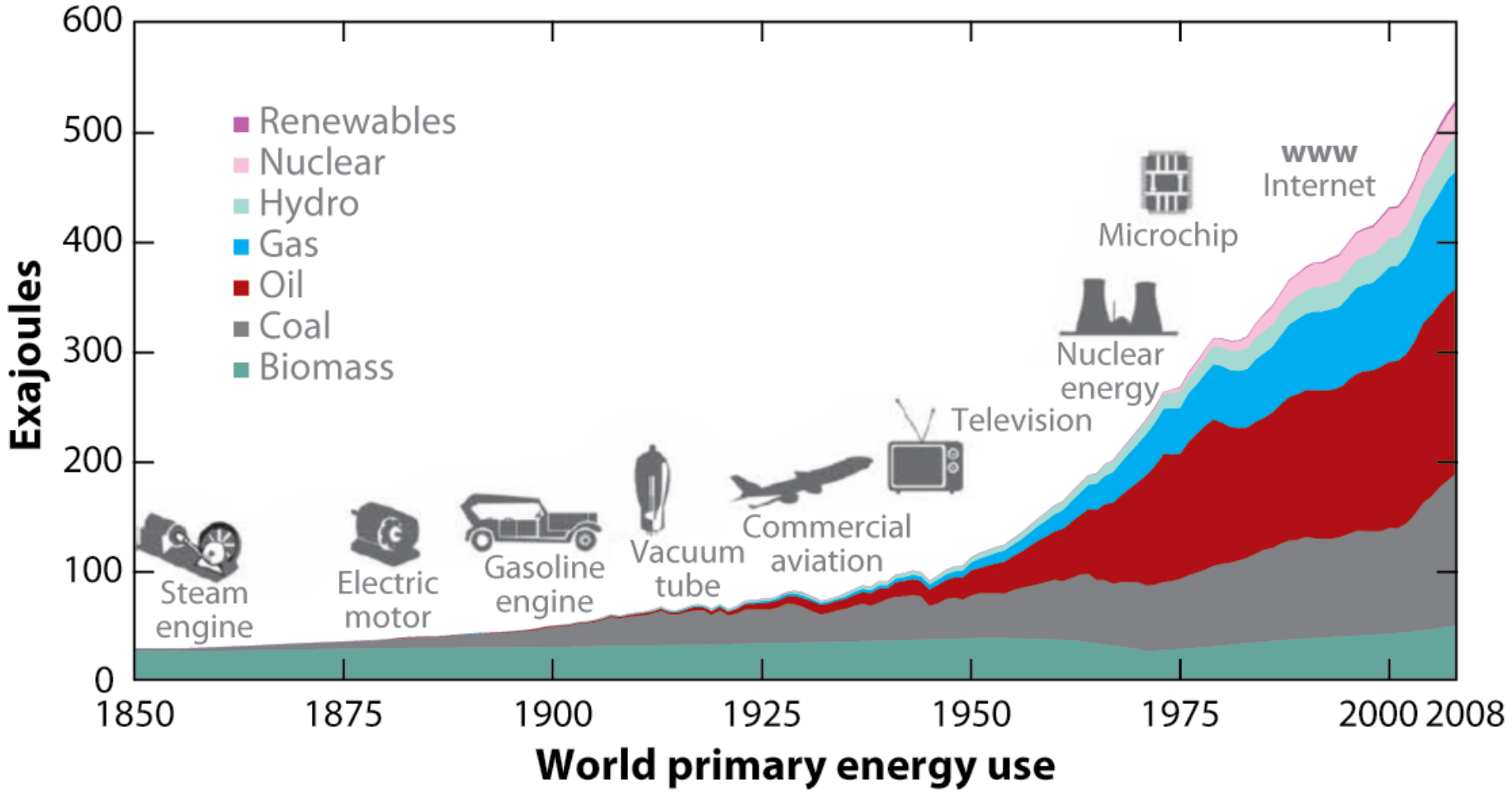


Paul Wilkinson , Kirk R Smith , Michael Joffe , Andrew Haines The Lancet, Volume 370, Issue 9591, 2007, 965 - 978


Pollution from biomass burning affects half the world's population

Transportation is an important and growing source of air pollution in developing cities, e.g., Accra, Ghana

Contrast with New York City: Less air pollution, but tons of CO_2 emissions



Smith KR, et al. 2013.

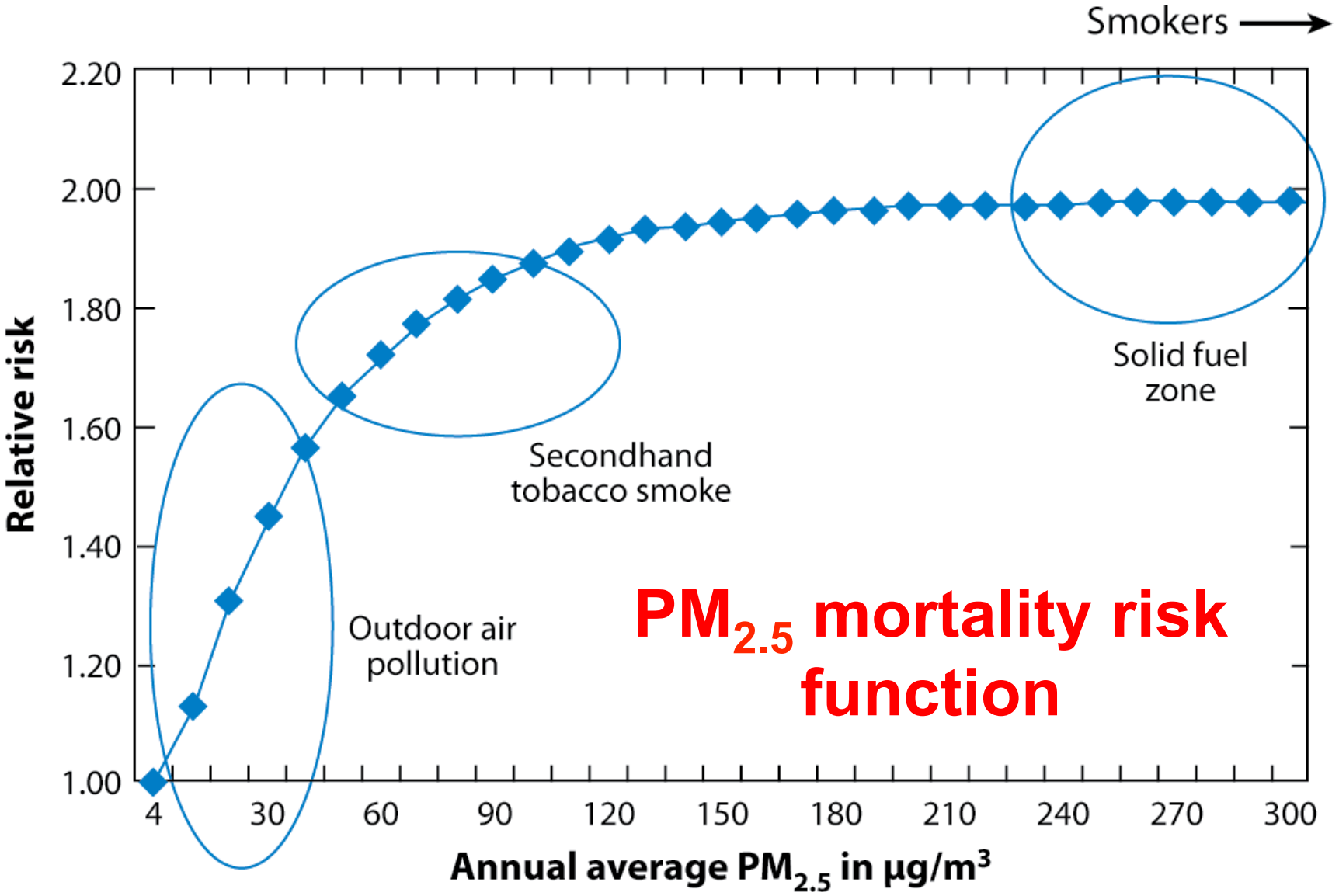
Annu. Rev. Public Health. 34:159–88

Health-Relevant Pollution Indicators: $PM_{2.5}$

- Extensive evidence of health impacts, including premature deaths due to cardiovascular and respiratory diseases
- A robust indicator of air pollution risk
- Includes many different chemical compounds
- Emitted by a wide range of different sources

Health-Relevant Pollution Indicators: Ozone

- Represents somewhat distinct mixture from PM (photochemical oxidation) with different seasonal, spatial and temporal patterns
- Effects on death and disease that are independent from, but much smaller than, those of PM



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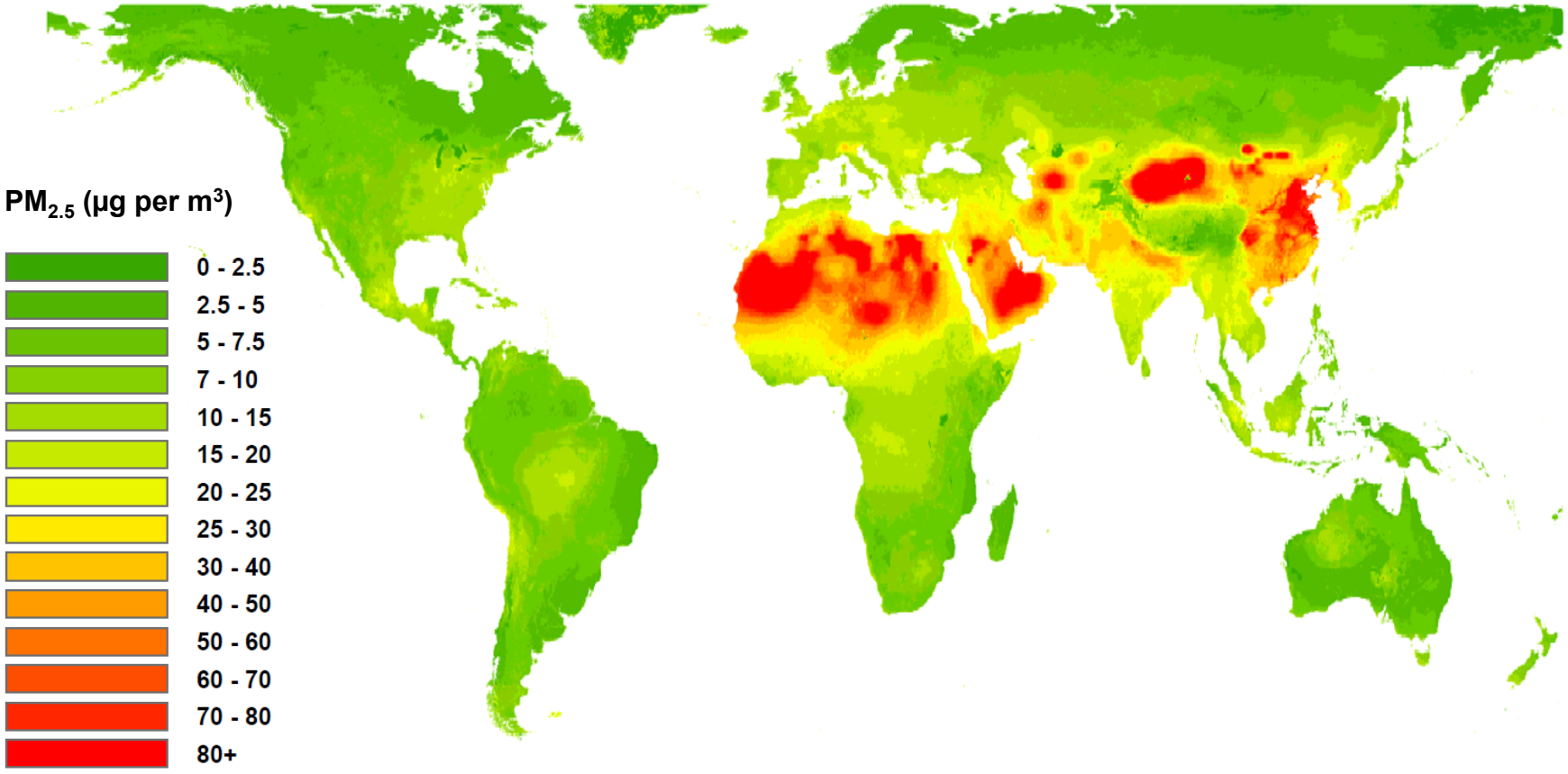
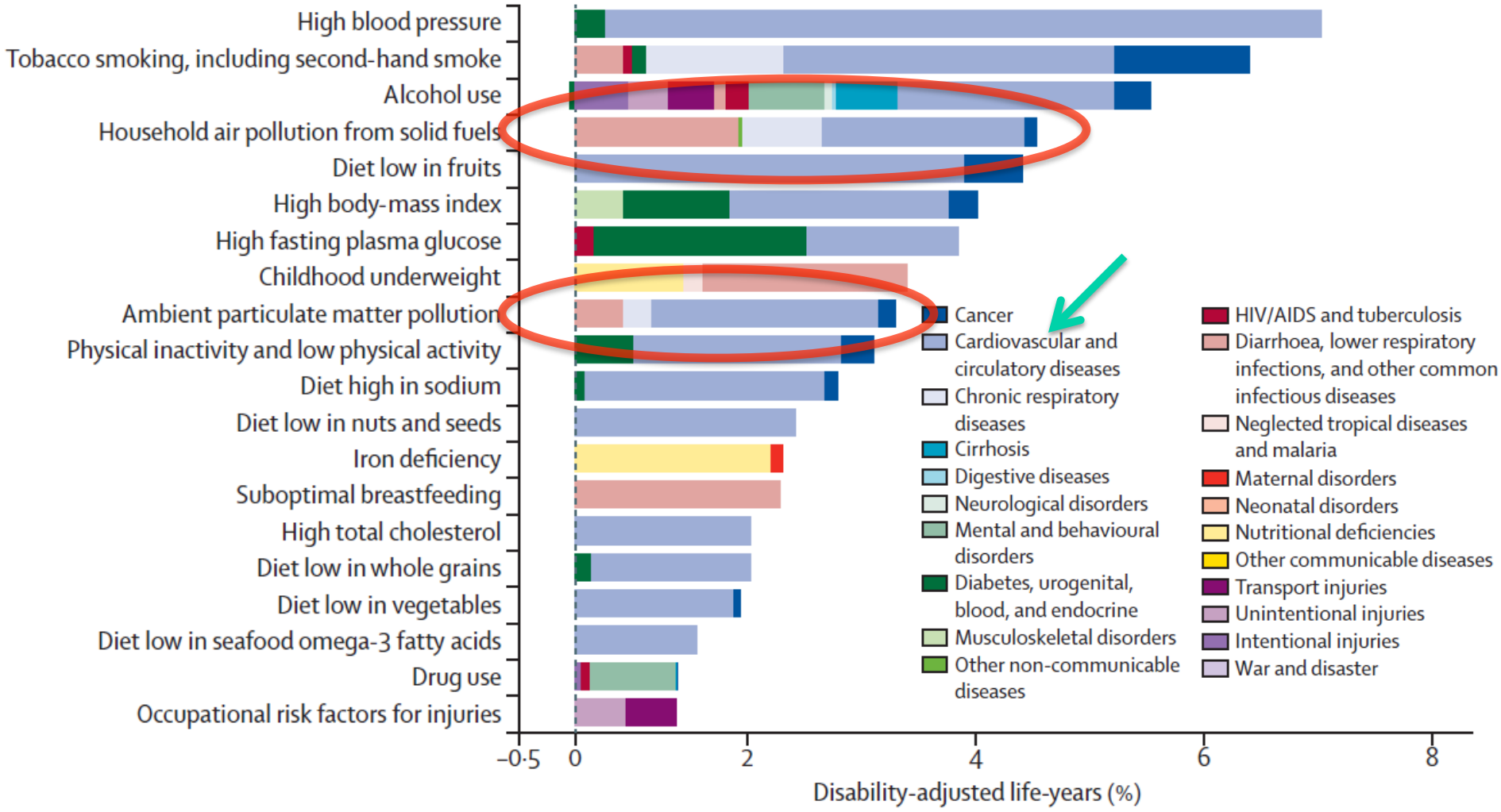
Global outdoor $PM_{2.5}$ concentrations

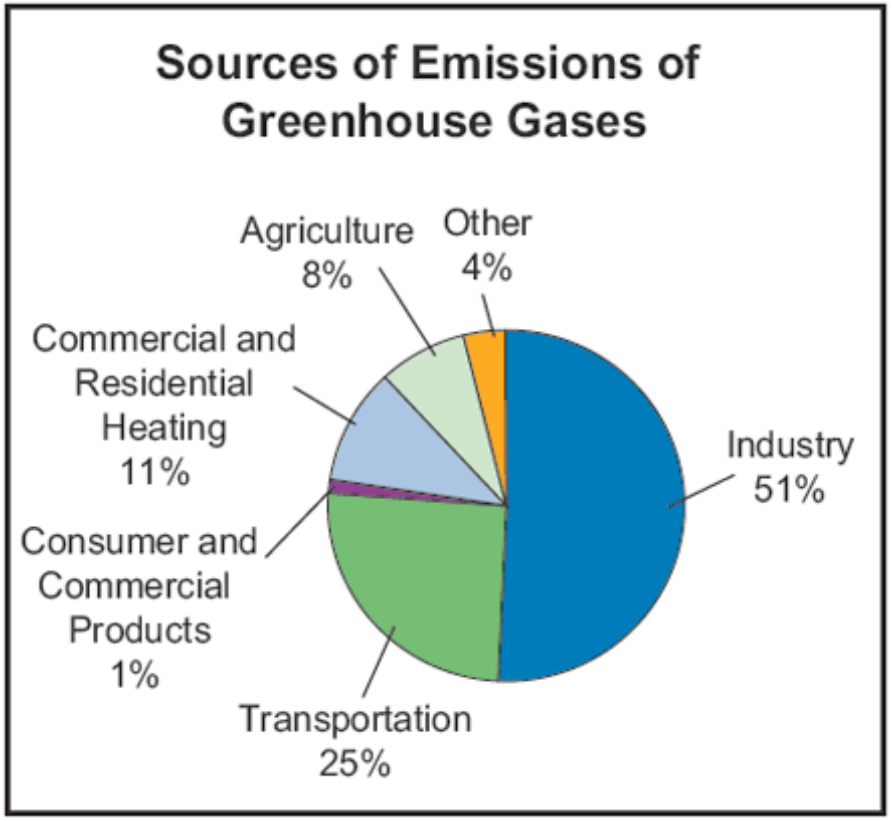
- Satellite-based measures of aerosol optical depth (AOD)
- TM5 chemical transport models
- Calibrated against ground-based $PM_{2.5}$ sensors

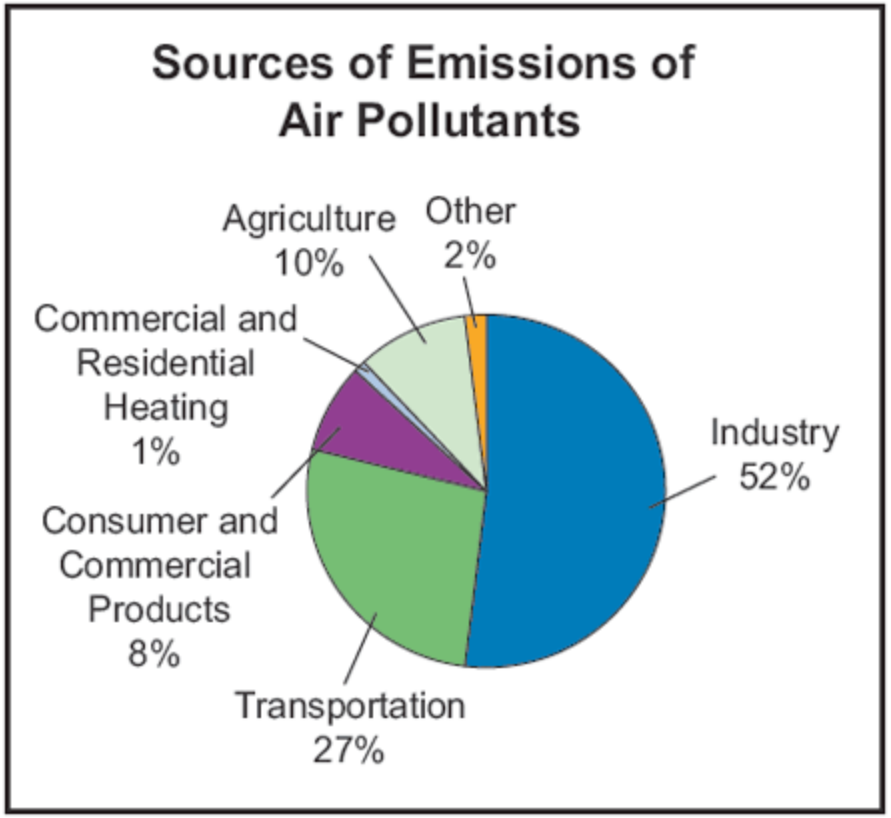


Global burden of disease attributable to 20 leading risk factors in 2010, expressed as a percentage of global disability-adjusted life years



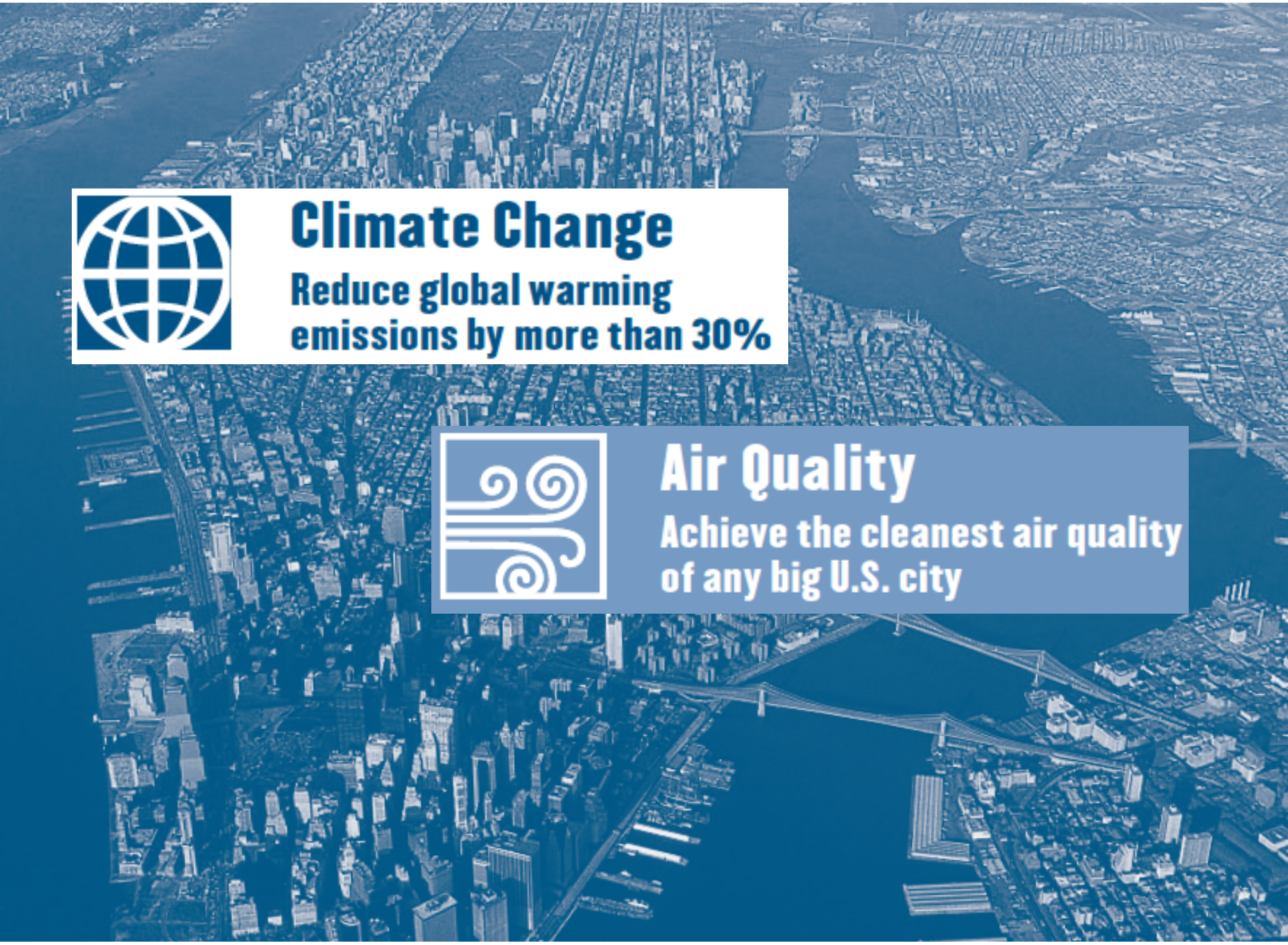
Sources are similar for both greenhouse gases affecting climate and air pollutants affecting human health



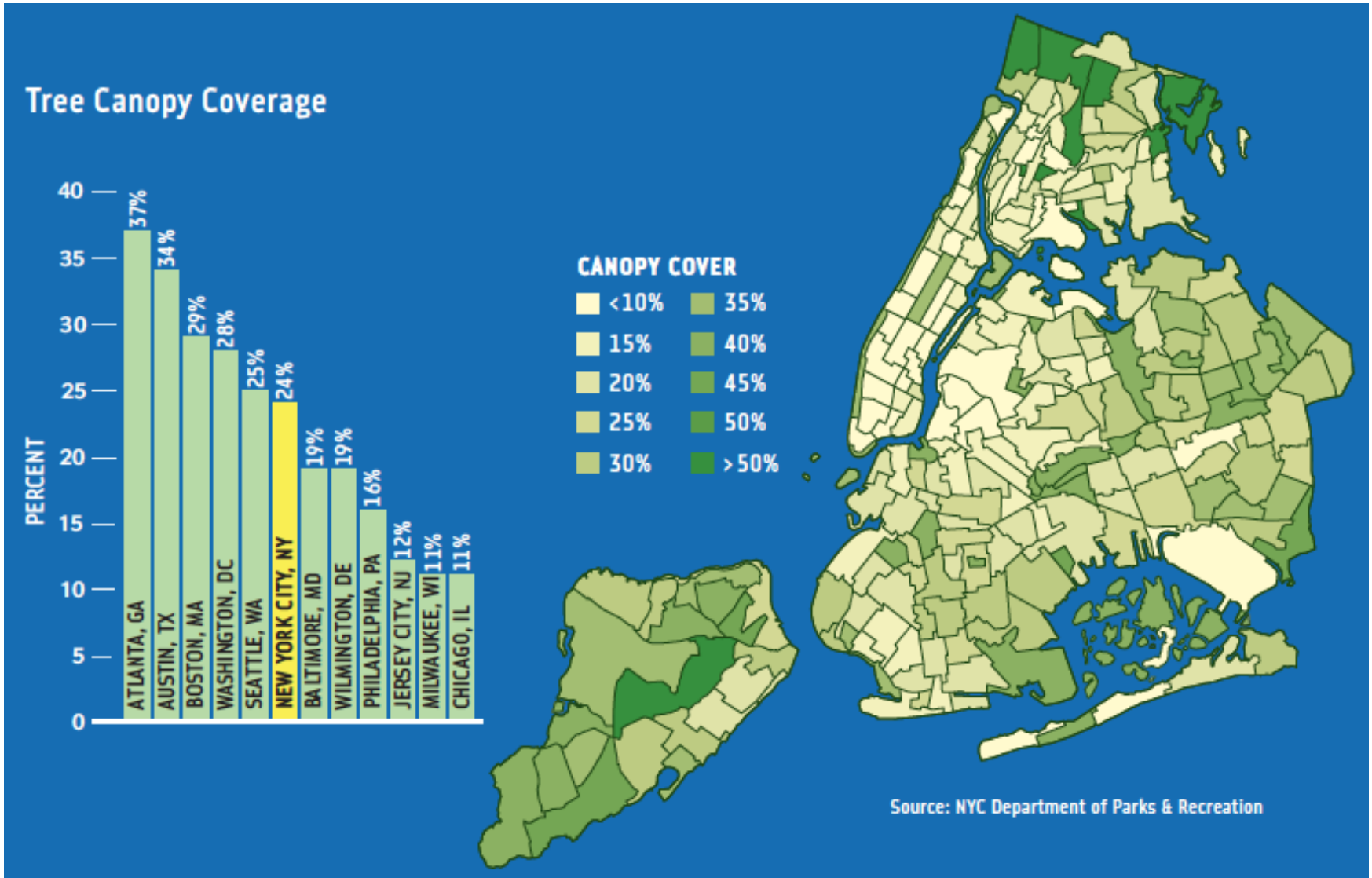


How are cities tackling these two problems?


planYC
Launched in 2007
127 initiatives in 6 broad areas:
Land, Water, Transportation, Energy, Air
and Climate
A GREENER, GREATER
NEW YORK


Climate Change
Reduce global warming emissions by more than 30%
Air Quality
Achieve the cleanest air quality of any big U.S. city

Greening: *Plant 1,000,000 new trees, for air quality and climate benefits*



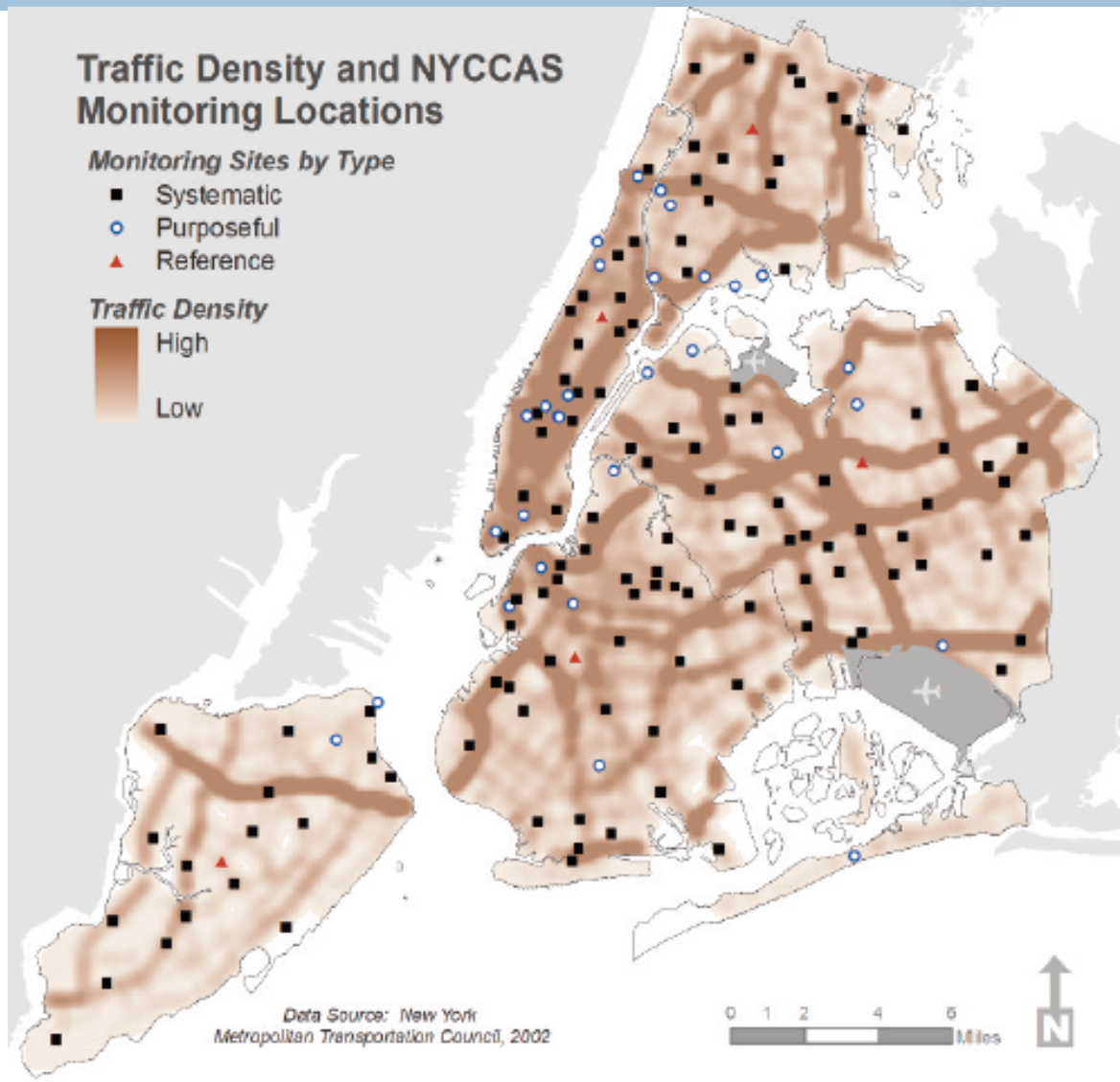
Active transportation:

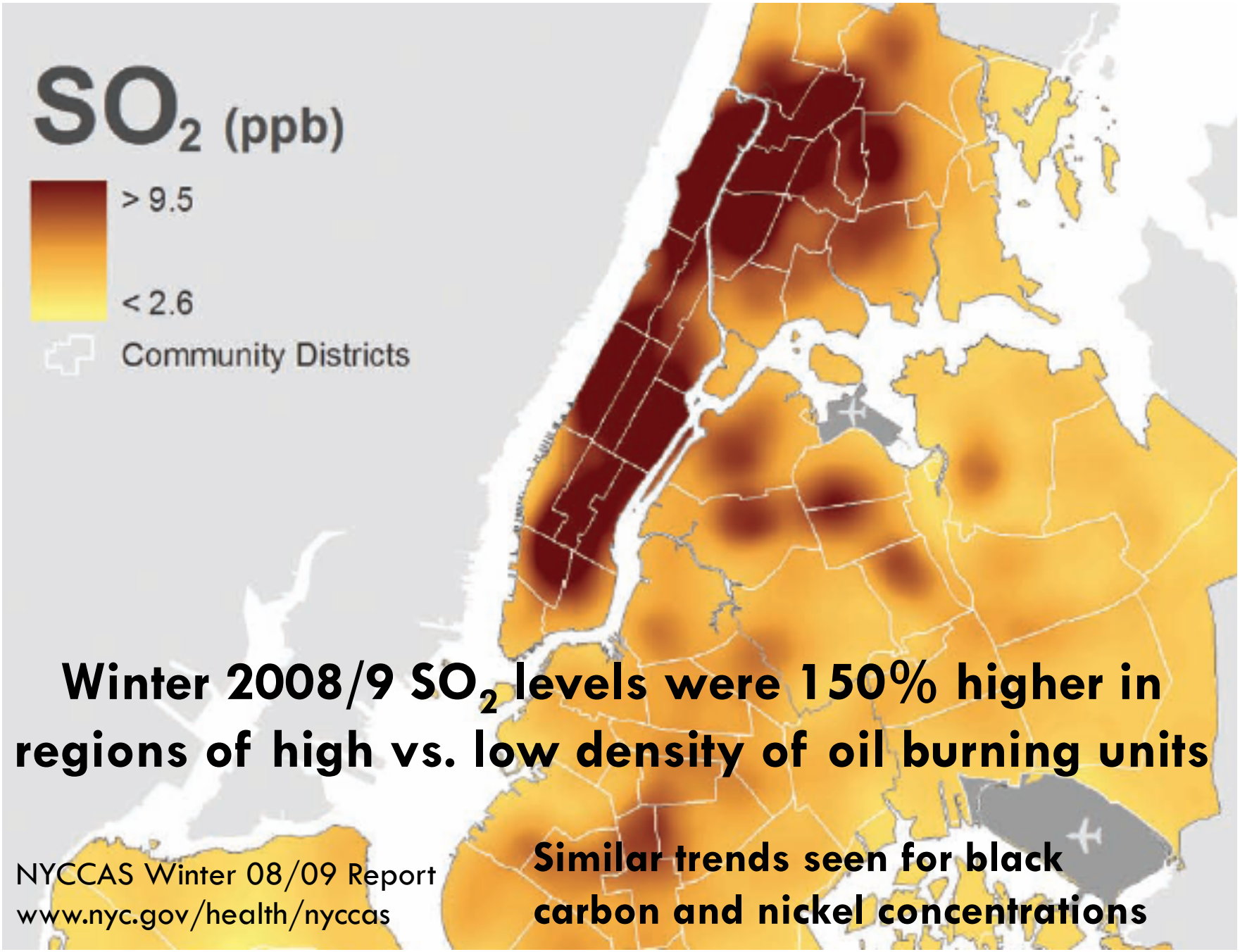
Implement citibike program

Monitoring and Assessment:
New York City Community Air Survey

NYCCAS Air Sampling Unit

NYCCAS Winter 08/09 Report
www.nyc.gov/health/nyccas





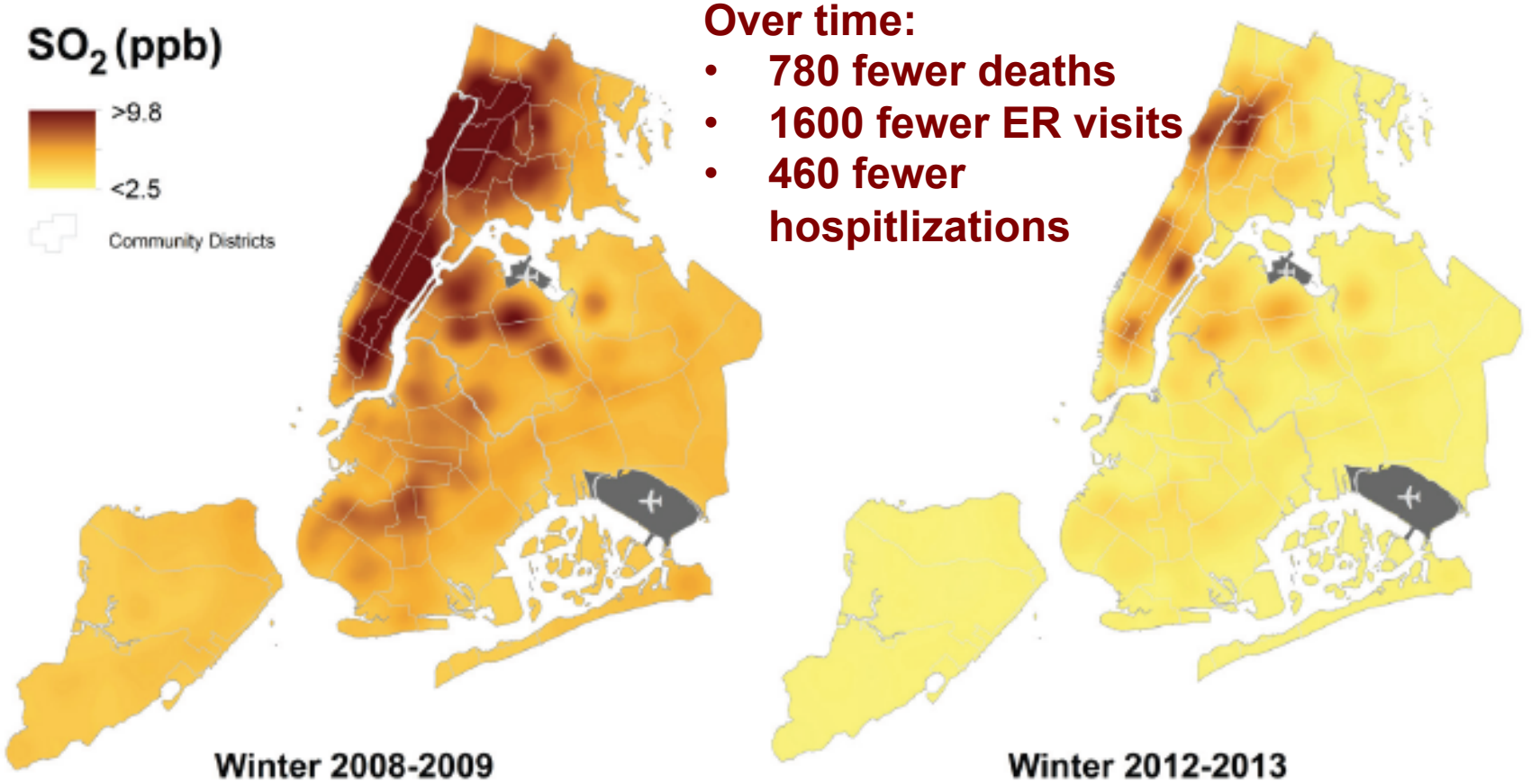
Winter 2008/9 SO_2 levels were 150% higher in regions of high vs. low density of oil burning units

NYCCAS Winter 08/09 Report
www.nyc.gov/health/nyccas

Similar trends seen for black carbon and nickel concentrations

Cleaner fuels for heating of buildings have led to a striking decreases in air pollution levels

Figure 3: Estimated SO_2 Concentrations, winter 2008-2009 and winter 2012-2013



Over time:

- **780 fewer deaths**
- **1600 fewer ER visits**
- **460 fewer hospitlizations**

NYCCAS 2013 Trends and Health Report
www.nyc.gov/health/nyccas

Summary

- Energy use leads to adverse health and climate impacts
- Developing countries are facing large health effects due to household and transportation energy use
- Rich cities have made substantial progress on air pollution, but emit unsustainable amounts of greenhouse gases
- Solutions to air pollution and climate challenges call for integrated strategies that maximize co-benefits

Extra Slides

Global Cardiovascular Mortality Estimates in 2000, by Emissions Sector

(using WHO comparative risk assessment methods)

Sector	Mortality	% of total Mort
Household biofuel	1,236,291	33.71
Industry	615,932	16.79
Agricultural waste burning	329,223	8.98
Biomass burning	302,908	8.26
On-road transportation	283,724	7.74
Household fossil fuel	230,030	6.27
Power	168,115	4.58
Animal Husbandry	142,964	3.90
Off-road (land) transportation	111,541	3.04
Agriculture	96,232	2.62
Waste/landfill	65,980	1.80
Shipping	48,333	1.32
Aviation	36,258	0.99
Total	3,075,251