



# Environmental Issues Related to the Electric Utility Industry

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# Major Issues

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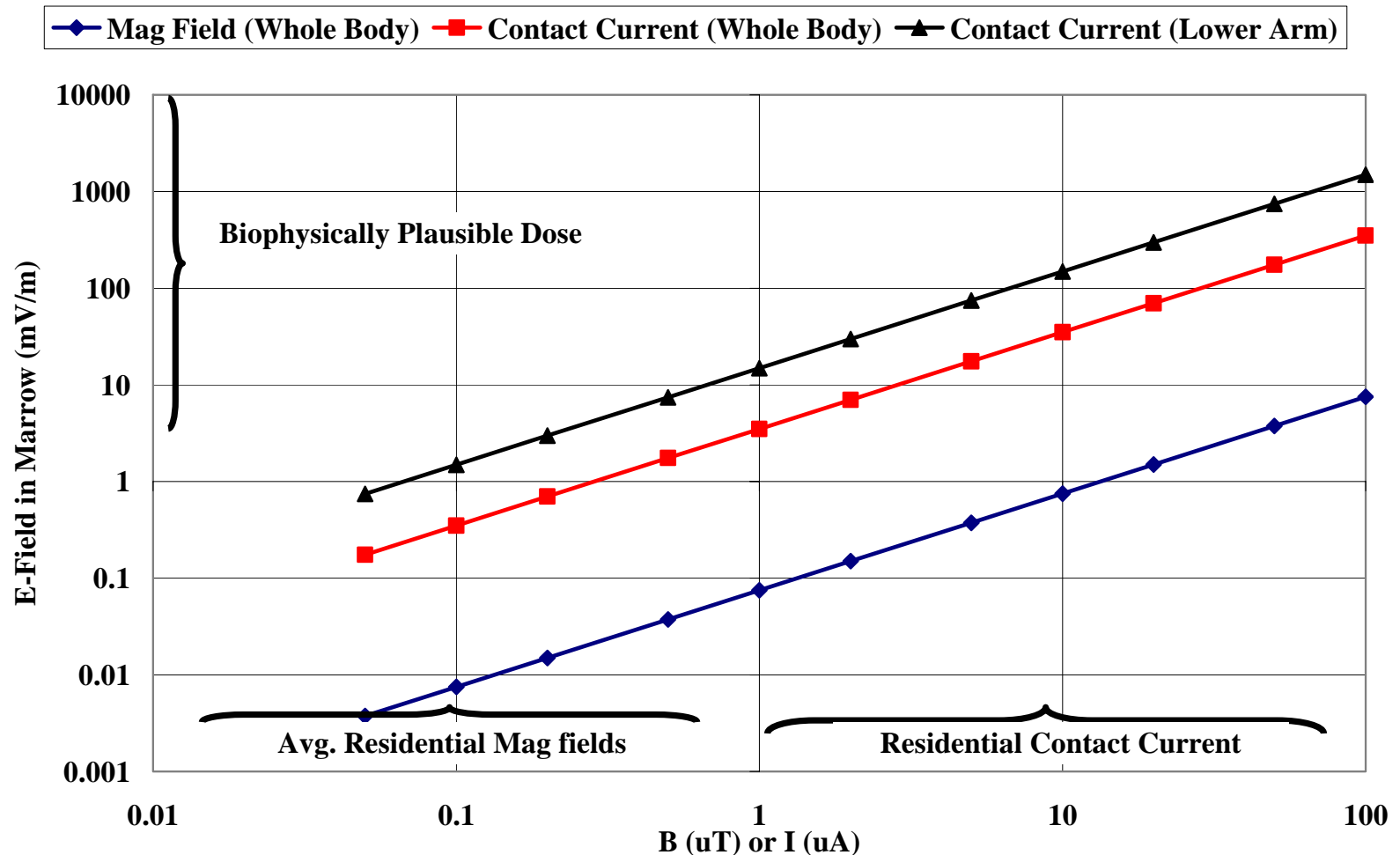
- EMF
- Water
- Climate
- Air Quality

# Issue: Magnetic Fields (MF) & Childhood Leukemia

- IARC, 2002: MFs are a “possible” carcinogen, based on epidemiological results on childhood leukemia
  - Lack of laboratory evidence
  - No biophysical mechanism at ambient levels
- EMF issue continues to affect utility facility planning; requires resolution

# Comparative Bone Marrow Dosimetry: Magnetic Fields & Contact Current

## 99th Percentile Dose to Bone Marrow



# Proposed Contact Current Exposure Scenario



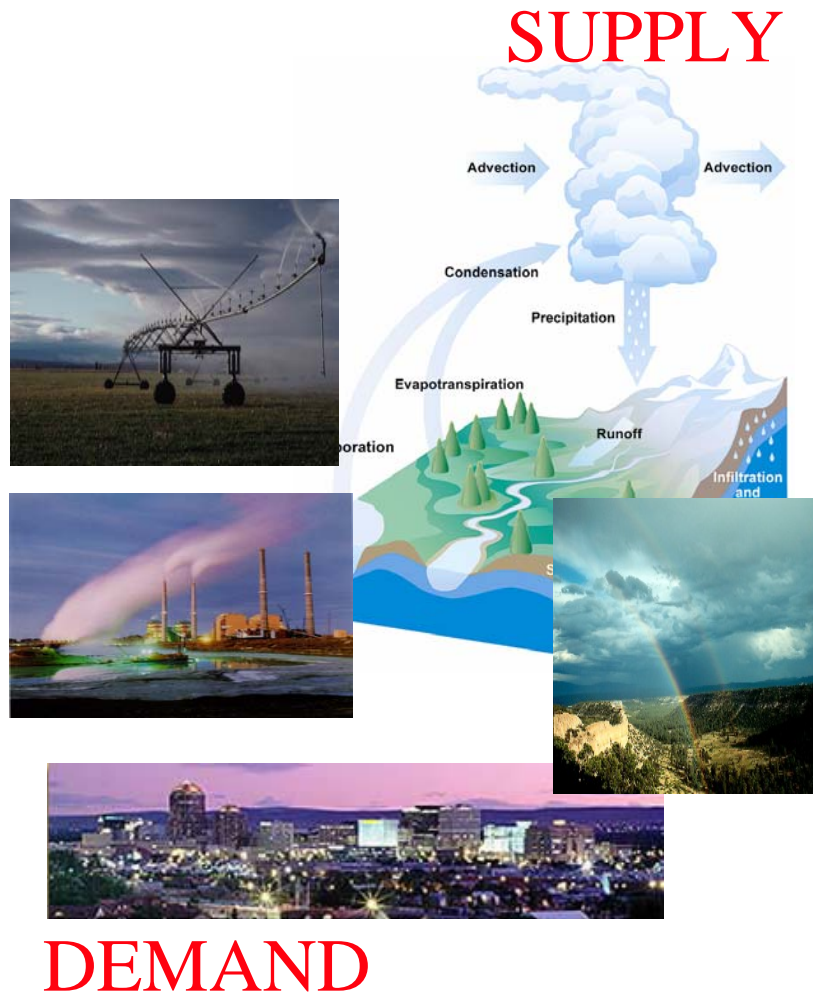
1. Voltage from water fixtures to earth due to residential grounding practice in US systems
2. Old style cast iron drains sunk in the earth become part of the grounding circuit
3. Voltage (10s of millivolts) from water line to drain drives current into a bathing child's hand
4. Association between magnetic fields and contact voltage in US

# Water Is a Critical Resource

- Fast growing demand for clean, fresh water
- Increased demand for environmental protection and enhancement
- All regions of US vulnerable to water shortages
- Water availability impacts
  - Electricity supply and demand
  - Electricity grid topology
  - Societal and economic infrastructure sustainability



# Consequences of Growing Electric Power and Water Demands



- More intensive management of water resources
- Greater integration between water and energy planning
- More watershed/regional planning
- New science and technology to support planning and management needs



# ZeroNet Water-Energy Initiative



# ZERONET





# Some New Research Ideas



- Power plant siting decision support system that incorporates water resource management and new generating and advanced cooling technologies
- Regional (interstate) integrated energy/water infrastructure strategic planning decision support framework
- Regional energy/water sustainability interest group and/or research center

# Issues for NYSERDA Consideration



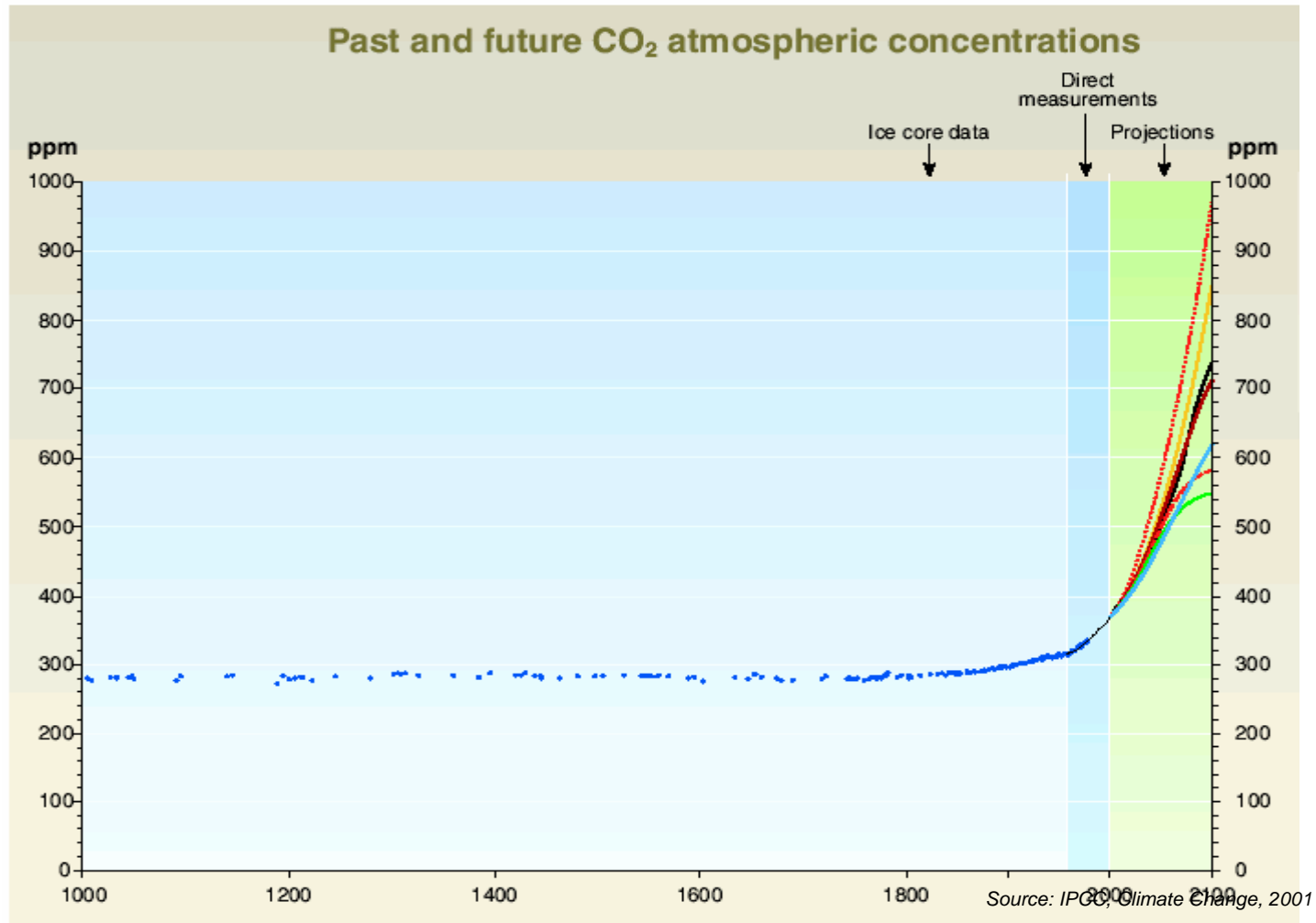
**NYSERDA**

- What are New York's current and future electricity related liabilities with respect to potential limitations in water supply? How can these liabilities be reduced?
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- How should regional electricity and water infrastructures be organized and managed to address increasing electricity/water demands.

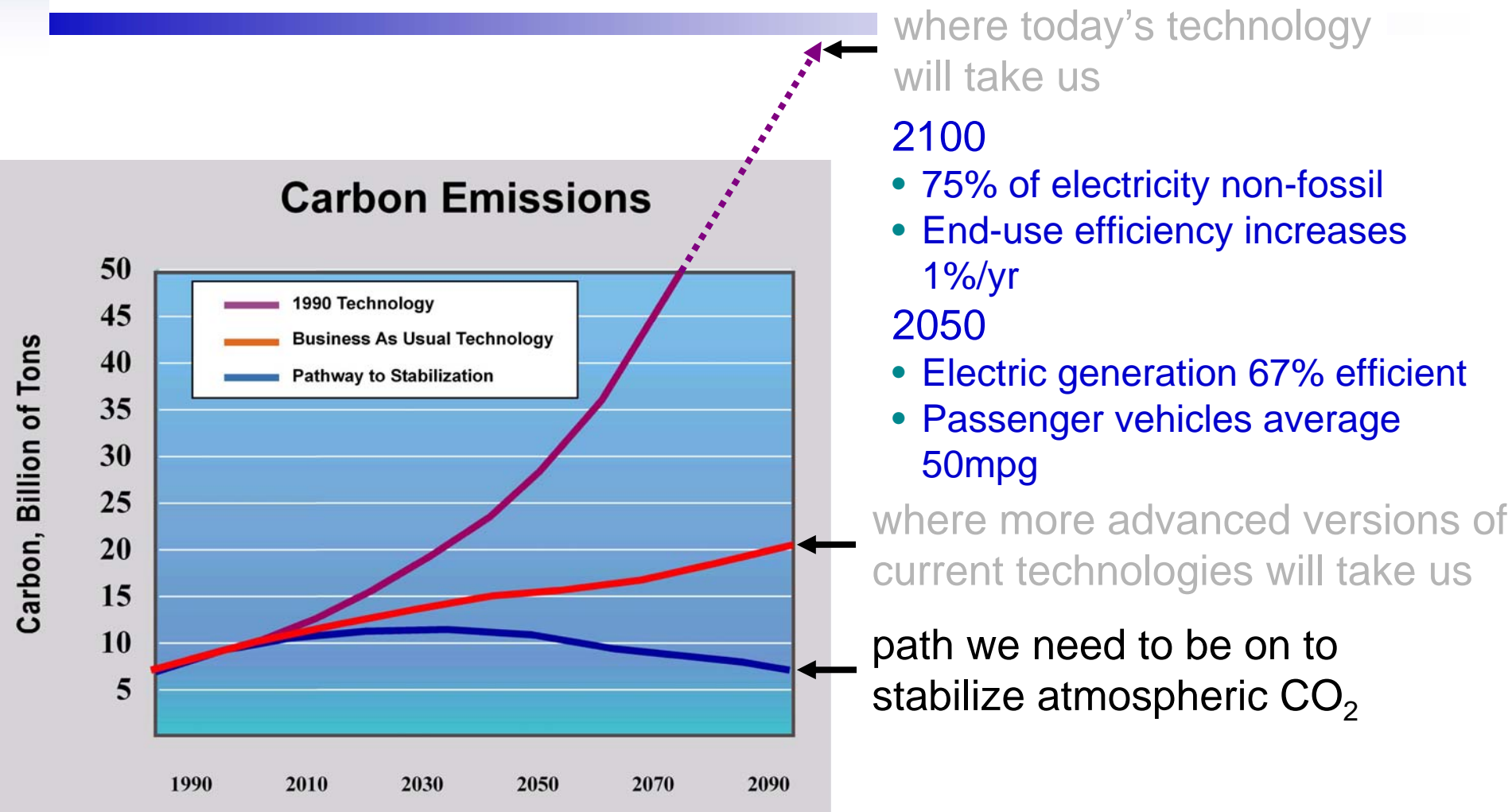
# Climate Issue

- Scientific community is in increasing agreement that anthropogenic activities are modifying climate
- Growing pressure to act on CO<sub>2</sub>... it is likely to increase
- Implications for the electric sector are huge
- Many options for reducing emissions are potentially available, but with a wide range of costs
- Optimum set of emission reduction actions depends on policy details and is company specific
- Mitigation is action... but action is not limited to mitigation
  - Help get the rules right
  - Invest in technology R&D
  - Know your emissions and learn about reduction choices

# CO<sub>2</sub> Concentrations in the Atmosphere Are Likely to Increase – 275ppm to 375ppm to ?



# Technology is Key ... Significant Advances Needed to Achieve the Base Case

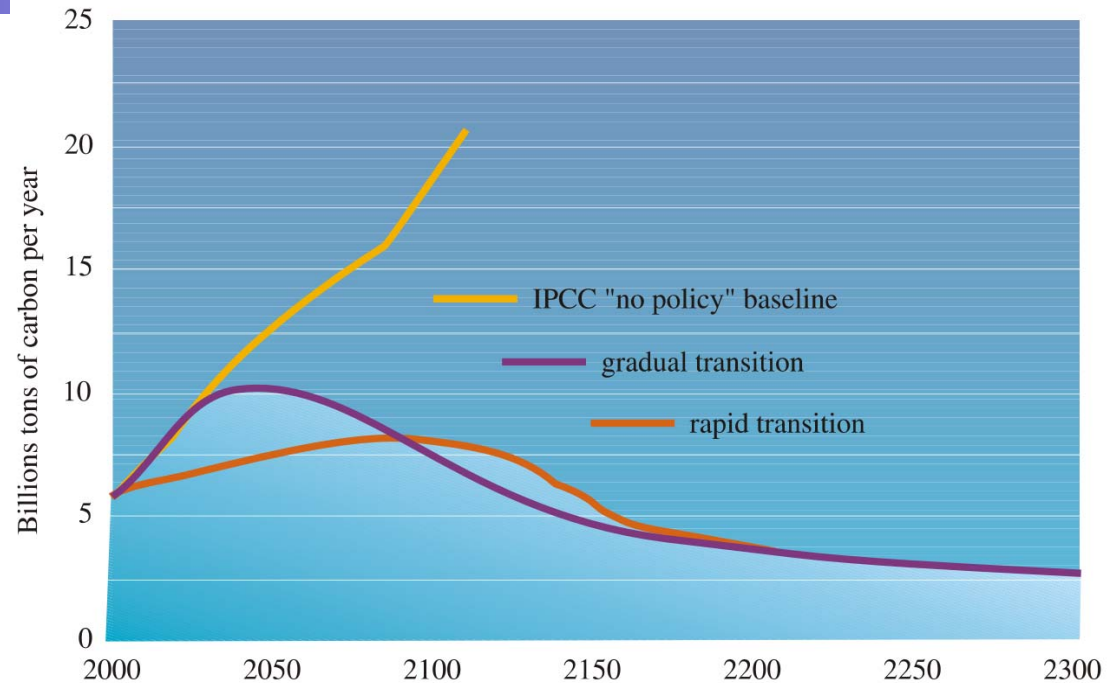


To stabilize at 550ppm, Carbon/\$GDP must be <10% of today's by 2100



# Implications of Climate Policies: Critical to “Get the Rules Right” Internationally

Flexible,  
comprehensive



- When – early gradual reductions followed by steeper ones
- Where – “low hanging fruit”
- Who – all current and future GHG emitters
- What – all GHGs (not just CO<sub>2</sub>)

# R&D Needs

- Assess costs and benefits of emerging policy proposals
- Identify the components of cost-effective international and domestic policies
- Identify and evaluate near-term compliance options for power providers
- Help develop company specific strategies
- Develop long-term technology strategy

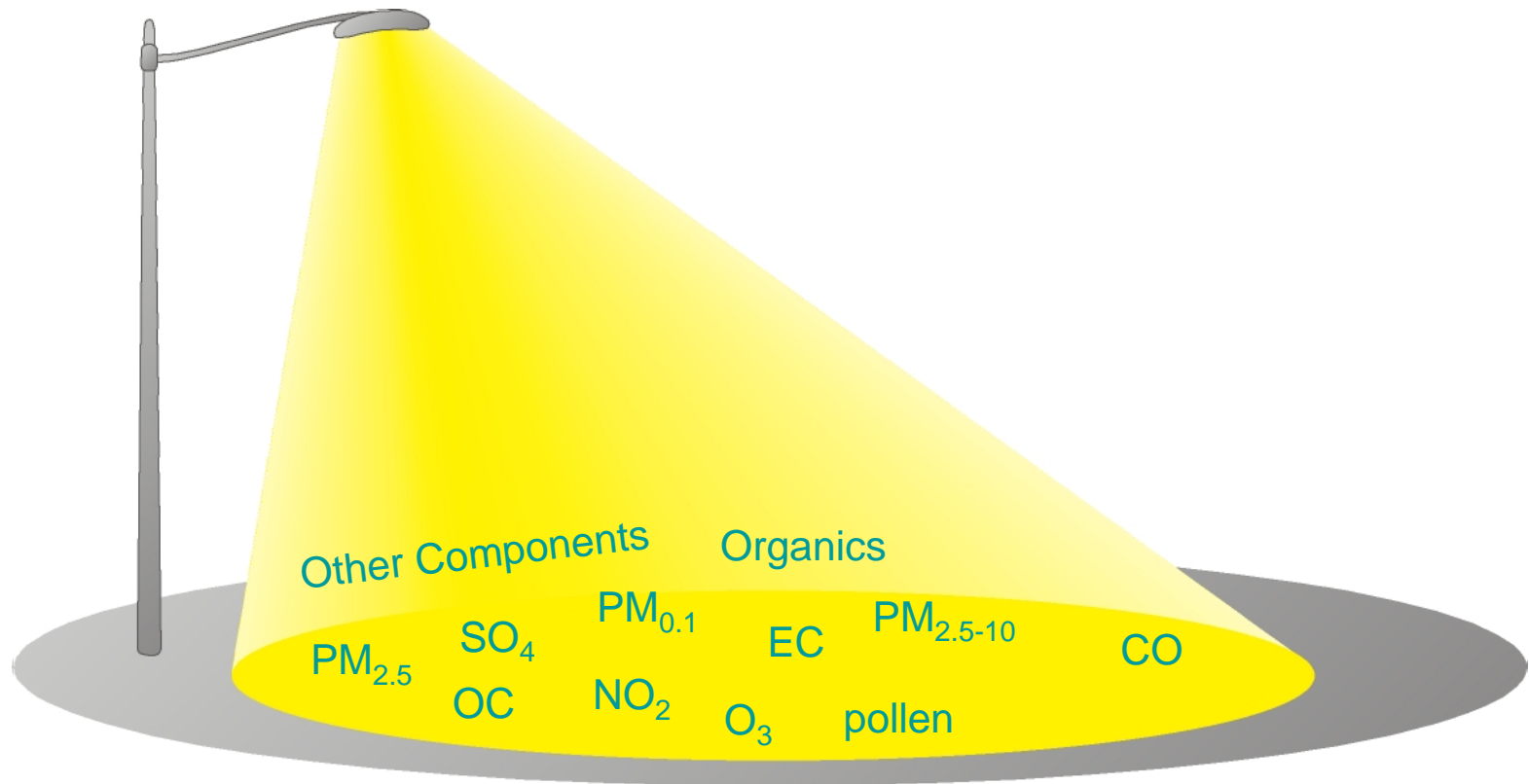
# Air Quality Issues

- Tighter PM standards
- SO<sub>2</sub>, NO<sub>x</sub>, control beyond CAIR
- Ozone standard review underway
- Health effects of air pollution at current levels



- Continued pressures to reduce emissions

# Epidemiology Studies Are Limited by the Monitoring Data Available



# Need More Detailed Monitoring

- Better emissions inventories
- Better epidemiology studies
- Consensus that not all PM components equally toxic
- Problem: air pollution is complex; measurements costly
- Components vs. “source” assessments
- Integrated epidemiological, toxicological approaches