Meeting the Strategic Challenges of Air Quality in the 21st Century

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Some Key Strategic Challenges

► Population
  ► Population growth and migration
  ► Growth in urban areas, megacities and urban sprawl

► Economic Development
  ► Not just population growth, but extensive increases in consumption
  ► Dramatic increases in food production & energy usage

► Climate Change
  ► Potentially profound effects on environment

► Regional Nature of Air Pollution
  ► Requiring regional and international cooperation
Finding Solutions to the Challenges:
Some Key Tools

► Rethinking Air Quality Management
  ► Multi-pollutant approaches and regional solutions

► Accountability
  ► Strong laws and effective enforcement

► International Cooperation

► Looking for Climate Co-benefits

► Developing Public Support
Progress Toward Clean Air 1970-2008
Pollution Down While Growth Continues
Benefits of Controlling Air Pollution Exceed Costs

1990 U.S. Clean Air Act
Retrospective and Prospective Studies
► What if there were no Clean Air Act in 1970?
  ► In 1990
    ► 205,000 premature deaths
    ► Millions of illnesses (heart disease, bronchitis, asthma)
  ► 42:1 ratio of benefits to costs resulting from cleaner air
► What if there were no Clean Air Act Amendments in 1990?
  ► In 2010
    ► 23,000 premature deaths
    ► 20,000 chronic bronchitis cases
    ► 7,200 chronic asthma cases
    ► 64,000 cardiopulmonary hospitalizations
  ► 4:1 ratio of benefits to costs resulting from cleaner air
Evolving AQM in the US

  Air Quality Management in the United States

**US air quality management system should:**

- Strive to take an integrated, multi-pollutant approach to address the most significant exposures and risks

- Foster control strategies that accomplish comprehensive reductions in the most cost-effective manner for all priority pollutants

- U.S. EPA pursuing opportunities to undertake integrated, multi-pollutant air quality planning
Why a multi-pollutant approach?

- Pollutants have many common emission sources
- Control technologies can affect multiple pollutants
- “One Atmosphere” - Atmospheric chemistry and transport affect all pollutants
- Exposure and deposition pathways can be similar among pollutants
- Multiple pollutants affect human health, climate, and ecosystems
A Changing Climate Affects Air Quality

- Climate change is expected to increase ozone in polluted regions and decrease ozone over oceans.

- Impacts of climate change on particulate matter are uncertain and vary from region to region:
  - Wildfires are increasing and are likely to intensify.
  - Increased precipitation washes particles out of the air.
Air quality impacts climate

Best estimates of climate forcing

(Adapted from IPCC Synthesis Report, 2007)
Regional warming impacts may be significant

In the Himalayan region, solar heating from BLACK CARBON at high elevations may be just as important as carbon dioxide in the melting of snowpacks and glaciers (Ramanathan & Carmichael, 2008).
Integrating Clean Air and Climate

- Reducing black carbon & ozone ("short-lived" climate forcers - SLCF) can lead to immediate climate benefits
  - The Earth’s climate system responds quickly to reductions in these pollutants
  - This may help us slow the overall rate of warming and possibly avoid climate “tipping points”, such as melting of ice sheets
  - Also, reducing black carbon & ozone may be particularly important for protecting sensitive regions such as the Arctic and the Himalayan glaciers

- Reductions in ozone and black carbon also provide significant public health benefits

- Controls on SLCF's will not eliminate need for rapid action on greenhouse gases -- controls on both long-lived and short-lived climate forcers are necessary
Accountability Equals Success

➤ US environmental laws provide a system of positive and negative incentives ("carrots and sticks") to ensure accountability of state environmental agencies:
  ➤ Training for state agency staff
  ➤ Funding for State environmental programs
  ➤ EPA review of state program implementation
  ➤ EPA review of key state actions like State Implementation Plans, permit actions, etc.
  ➤ National emission standards
  ➤ EPA enforcement

➤ In the US, the public plays critical role in ensuring commitments are kept
  ➤ Public review of permits
  ➤ Notice and public comment on air quality & emission standards
  ➤ NGO’s play a key role as public “watchdog”
Complete redesign & upgrade of current system

- Updated infrastructure: Multiple languages, world-wide mapping, open source software

Pilot in progress in Shanghai

- Interest in other regions in China
  Hong Kong / Guangzhou and other nations Brazil, Panama, South Africa
THANK YOU!
谢谢！

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