

US EPA ARCHIVE DOCUMENT

# IMPACTS OF CLIMATE CHANGE ON AIR QUALITY IN THE PACIFIC SOUTHWEST

## Major Themes for Future Work and Collaboration

### Co-Benefits/Tradeoffs of Climate Change and Air Quality Policy/Technology Decisions

- In our climate change efforts, we need to look for opportunities to reduce other pollutants at the same time – co-benefits
- We need to work on understanding more about what are the implications of climate change and possible control strategies are.
- How is the effectiveness of AQ management affected by climate change?
- What are the win-win scenarios for climate and air quality?
- Which air pollution control scenarios are worth pursuing in a changing climate regardless of the uncertainties associated with various future scenarios?
- Look for GHG controls with co-benefits of improving air pollution.
- Need to continue to work to identify trade-offs and co-benefits of climate change policies.
- We need to avoid pitting climate change regulation against criteria pollutant control.
- For climate change technology, we need to look at win-win situations.
- We need to watch out for fuels that are good for climate but cause criteria pollutant impacts.
- Work on synergies between GHG, criteria pollutants, and air toxics for the following issue:
  - Energy efficiency
  - Demand side management programs
  - Renewable energy
  - Land use & transportation planning
- Fire suppression and controlled burning strategies. Would a more aggressive controlled burning program ultimately reduce PM from uncontrolled wildfires? If so, USDA, DOI, state forestry and local AQMDs should make collaboration on this a priority.\*
- Develop a tool to incorporate climate change policy decisions into air quality models. For example,
  - What are the impacts of increased ethanol use on air quality?
  - What are the impacts of fuel efficiency standards on air quality?
- How can research help us better prioritize the response choices that will be most effective to address anticipated air quality impacts?
- Quantify benefits of GHG reduction strategies (such as land-use and green building) and also wasted opportunities if not embraced. Do emissions as well as economic impacts.

### Regional/Local Air Quality Impacts from Climate Change

- We need to understand the specific regional texture of impacts.
- What is effect of projected changes in climate, climate variability and land-use patterns on regional U.S. AQ (O<sub>3</sub>, PM, also Hg)?

- Which areas will experience AQ improvements and which deterioration due to climate change alone?
- How many areas are at risk of failing to attain standards?
- We need to know whether additional emissions reductions will be necessary to meet air quality standards.
- In a changing climate, which areas of the US will find it harder or easier to meet the PM or ozone NAAQS?
- What is the magnitude of the “climate penalty” related to controlling ozone?
- Problems are developing in formerly pristine areas, such as Great Basin National Park – how do we manage this?
- Increase in background ozone levels could approach the 8-hour ozone standard. What would this mean for air quality management?
- We need to work on regional impacts. Air quality map of US is very patchy - regionality is key (spatial variability).

#### Compare Climate Change to Other Impacts on Air Quality

- What is impact of climate change relative to emissions changes (due to controls, land use change, and socioeconomic changes)?
- We need to consider socioeconomic considerations such as projections of changes in population and demography.

#### Particulate Matter and Other Non-Ozone Pollutants

- Resolve uncertainty with mixed impacts of PM on climate and visibility.
- Which components of PM are most important for public health and/or climate impacts?
- PM is considered a major problem (CA, AZ, NV, and Baja California all mentioned it)
  - Winter 2005 was one of the warmest, driest winters in history – ideal conditions for generating dust.
  - Wildfires
  - More research needed
- Increasing temperatures increases crop pests, which in turn increases the need for more pesticides – how does this impact air quality?
- There is no clear correlation between PM<sub>2.5</sub> and temperature – more work needed on this.
- The relationship between climate change and PM is complicated. We need more work to determine how this will play out (numerous comments).
- The model predictions of PM needs work.
- Assess extent of interannual variability in PM predictions.
- Plan to include air quality component into fire management (WALTER).
- Future forcing by CO<sub>2</sub> (climate-carbon cycle interactions) and aerosols are key uncertainties (for the future).
- Fire suppression and controlled burning strategies. Would a more aggressive controlled burning program ultimately reduce PM from uncontrolled wildfires? If so, USDA, DOI, state forestry and local AQMDs should make collaboration on this a priority.\*

### Human Health Impacts

- We may need human health impacts in the endangerment finding.
- We need to develop meaningful and measurable health data for climate change impacts on air quality.
- Translate predictions into health outcomes

### Information Sharing and Management

- Plea for data sharing: Exchange Network
- Issue – how to manage emissions and adaptation data?
- There is a need for a comprehensive resource network
  - Inventory protocols & tabulated data
  - Technology development & availability
  - Implementation experience
- Need better data sharing opportunities and mechanisms.\*
  - Share statistics
  - Convert stats into action and policies

### Social Science: Economics, Communication, Social Marketing, etc.

- Public support needed: How do we get it? Social science and historical work needed, or we'll end up just talking to ourselves.
- California's actions on climate change may increase the flow of polluting used vehicles to Baja California. The same effect is possible for industries such as electric generation. Actions on climate change make sense only when the region as a whole is integrated.
- We need on-going research on economics, socioeconomics (including environmental justice), and air quality impacts from climate change.
- We need economic analyses on the costs of unmitigated impacts, adaptation, and mitigation.
- We need to consider socioeconomic considerations such as effects on environmental justice communities.
- Consider differential impacts on people and societies.
- Protect the commons, but exercise precaution for the special losers from the policy decisions.
- Learn how to communicate scientific messages to policy-makers and lay people.

### New Technology

- We need research on carbon sequestration and clean coal technology. This is especially important as we are permitting new coal power plants.
- We need to find new and improved ways to use remaining fossil fuels and reduce CO<sub>2</sub>.
- Need technology demonstration (example of plug-in hybrid school bus demo for school district)

- Need additional research on energy efficiency for: appliances, industrial applications, transportation corridor design, and goods movement systems. For example, we need to look at the entire transportation and goods movement system beyond just putting on diesel controls.
- We need additional research on battery and energy storage technology.
- Is there evidence that carbon sequestration is feasible?
- We need more research and full-scale demonstration of capturing CO<sub>2</sub> emissions from power plants and other large sources using algae bioreactors. The algae can then be harvested to produce biofuels like biodiesel.
- Energy efficient light bulbs that work with dimmer switches.
- Carbon sequestration research needed.

### Tribal Issues

- One of the greatest challenges of tribal agencies is obtaining and maintaining a place at the table regarding national climate change legislation and policy.
- GHG emissions inventories for tribal lands.
- EPA's goal, since 2000, has been collaboration amongst agencies. State and tribal agencies or governments have their own jurisdictions and sovereign authority. When there is collaboration on projects with funding opportunities, EPA decision-makers (for grants) do not recognize the proposal for the partnerships of agencies as separate government structures, with their own needs and wants. In the past, EPA has only funded one agency on a collaborative project/proposal where there should have been three for all the agencies that are involved and submitted proposal for funding on the same project.

### Tools/Resources

- We should try to add climate change impacts into State Implementation Plans, but this is difficult to do because the timescales don't match (criteria pollutants vs. greenhouse gases (GHG), and the relationship between them)
- Information Needs: current GHG inventory development feels like where we were decades ago for criteria pollutants – we have a long way to go.
- We need to integrate GHG into existing funding opportunities.
- We need to better identify experts at all levels
- We need user-friendly modeling tools for:
  - Policy Scenarios
  - CEQA Applications
  - General Plans
- We need user-friendly modeling tools, simplified so that people can pick their own strategies for design and mitigation.
- We need air quality projections with the following characteristics:
  - 2050 ozone and PM<sub>2.5</sub> for central and southern California
  - Include changes in inversion frequency and emission effects
  - Quantify increased death and disease due to “climate penalty”
  - Estimate additional control costs

- We need to resolve limitations for SIP planning:
  - Modeling time frames do not match.
  - Climate change tools are not accurate for planning horizon.
- We should work on advancing the following SIP opportunities:
  - Add temperature sensitivity to air quality models runs.
  - Estimate air pollutant co-benefits of greenhouse gas reduction measures.
- There are needs for funding opportunities, contact information, and resource links.
- We need multiple tools and approaches to look at CC issues – weight of issues.
- Plan to include air quality component into fire management (WALTER).
- Decision support tools may facilitate dialogue between managers and public
- Develop a tool to incorporate climate change policy decisions into air quality models. For example,
  - What are the impacts of increased ethanol use on air quality?
  - What are the impacts of fuel efficiency standards on air quality?
- GHG emissions inventories for tribal lands.

#### Climate Change Policy Development

- California's actions on climate change may increase the flow of polluting used vehicles to Baja California. The same effect is possible for industries such as electric generation. Actions on climate change make sense only when the region as a whole is integrated.
- We need to avoid pitting climate change regulation against criteria pollutant control.
- We need land use guidance.
- State and local agencies need federally-enforceable rules. Since there is no such thing as “non-attainment” for climate change, state and local agencies don't have the authority/pull with local boards.
- Land-use is an important factor when considering sources and targets of air pollution. We need outreach tools targeted at County Supervisors, city/town council persons, and environmental groups for climate impacts and solutions.
- Do we have a consensus on what the priority research info needs are? Or do we have a system to develop this?
- Establish GHG as regulated air pollutants for the purposes of Title V.
- Oppose new coal-fired power plants without carbon sequestration.
- Global climate change is an emergency – we need to respond to it as such. This means immediate, drastic actions to reduce emissions. The EPA needs to take a stronger leadership role, and to focus on reducing emissions in the transportation sector. How will we get all these cars off the road? How can we support public transit?
- Give people real, tangible incentives.
- Technology transfer to India, China, and Mexico:
  - Cleaner power plants
  - Cleaner vehicles
  - Transportation alternatives (public transit, etc.)
- Multi-media approaches and evaluation needed. Mitigating global climate change and its effects is more than an air quality issue and doesn't only fall on the shoulders of air

quality managers. Must collaborate with waste, energy, transportation, economics experts as well.

- Instead of attempting to shoe-horn climate change issues into existing programs, additional resources (funding) need to be committed. This is especially true for tribes, who will be disproportionately impacted by global climate change.
- How can we better capitalize on media portrayal of the issues to support our voluntary programs?
- More focus on the building/land use implications for greenhouse gases:
  - Green building
  - Transit oriented development
  - Infill/smart growth
- Implement “behavior inducements” – carbon tax, high gas tax, etc. Then spend this money on infrastructure to reduce emissions through:
  - Public transit
  - Green public building
  - Tech transfer to Mexico/Asia
  - Subsidies for solar/wind power on large scale and home scale
- Phase-in strict regulations with teeth, for vehicle size and fuel mileage requirements

#### Other Research

- We need more research on the change in weather patterns and inversions (Reno has over 300 days per year of tight inversions).
- We need more work understanding how climate change will affect inversions (which then impact air quality).
- We need to consider global methane increases.
- Future work – look at changes to deposition, changes impacted by elevation, and interannual variability.
- NOAA Initiative
  - Looking at integrated climate forcing and air quality, hoping for better answers; CA prototype in 2010.
  - NOAA Plans for FY2010: intensive field campaign with aircraft and ship measurements; transformations are much better understood than emissions and deposition
- Quantification of emissions is essential for any mitigation strategy
  - Quantify emissions different sources (e.g., ship emissions).
  - Measure ambient levels outside of plumes.
  - Measure constituents together to evaluate relative emissions.
  - Quantify processes on time and spatial scales needed for air quality and for climate forcing.
- Clarify the impact of mixing depth on air quality.

#### Collaborations

- Some roles in collaboration

- The EPA Regional offices can play an important role in gathering the various interested groups together, in efforts like this event.
  - ORD plays a critical role in providing resources and support.
  - Scientists in R9 contribute outstanding research.
- BAAQMD current collaboration activities:
  - local govt. and regional collaboration
  - working with ARB and CAPCOA on AB32 implementation
- EPA Regional offices can play a particular role in collaborations: experience in program implementation
  - Regulatory programs
  - Incentive programs
  - Public education/outreach programs
  - Research programs
  - Technology demonstration programs
- The EPA Regional office can bring together: local businesses, community representatives, local governments, and academia.
- Collaboration
  - NOAA Initiative: looking at integrated climate forcing and air quality, hoping for better answers; CA prototype in 2010.
  - NOAA Plans for FY2010: intensive field campaign with aircraft and ship measurements; transformations are much better understood than emissions and deposition
- How best can EPA use its statutory gap-filling and trust authority to support and/or implement tribal policies to address GHG emissions?
- Need more collaboration with other government agencies to [instill] green business practices throughout government.
- How best can the Federal government (and EPA in particular) support state/tribal initiatives to reduce GHG emissions through changes in land use?
- Establish long-term, funded partnerships (with third party facilitation) between agencies and science units to build capacity:
  - For policy-makers to communicate needs, and understand scientists
  - For scientists to communicate results, and understand policy-makers needs and issues.
- Work with LBNL on urban heat islands and “cool surfaces.” Some simple changes (which are cost-effective) can make quite a difference in temperatures, and therefore, ozone formation.
- Since vehicle emission reductions are critical for reduction of greenhouse gases, can EPA step up efforts to work with states and local agencies on land-use programs as a way to address climate change and sustainability together? Overall energy savings are another co-benefit of smart growth. When will we be able to talk about the connection between climate change, air quality, and emission sources to the public?
- What role can EPA R9 play in bridging differences and facilitating communication between Washington DC (eg., EPA HQ) and the states/tribes? This need is particularly acute when EPA considers waiver requests or Congress debates pre-emptive climate legislation.

- Ensuring that best practices/policies resulting from state/tribal GHG reduction initiatives are fed back into Federal legislation and regulation requires:
  - Federal involvement in observing and analyzing state processes and outcomes
  - State willingness to share information and data.
- Climate change should have a wider regional perspective at least for the Mexican State of Baja California. GHG reduction measures inside Region 9 could promote a growth of non ocean transport and cleaner energy production in Mexico. So we think that Mexican States (Baja California) should be inside a climate change policy for the Region 9 for these two issues.
- Consider collaboration with UK on economic modeling of climate change/air quality impacts including researchers involved in Stern Review of the economic impacts of climate change.
- The National Academy of Sciences hosted a 2-day meeting on Public Health Impacts of Climate Change (Presidio, Sept. 2007). The scientists felt that public health practitioners need to be well informed and start planning to get the public engaged (more trusted). Can EPA, states, and health practitioners collaborate in this effort?
- Although it's very useful to have in-person conferences, I wonder why we don't have more conferences via the internet? I believe the tools are readily available to have people log in and participate in conferences like the one we're enjoying today.
- It is difficult to adequately shape the EPA Regional role without having complete background on what is going on nationally with EPA. Can we start a dialog with other Regions on climate change programs? -especially transportation and land-use.
- We should be reaching out to individual cities within R9 for this effort and look to other model cities outside the region (i.e., Portland, Seattle, NYC, etc.) as leaders of minimizing climate change impacts on air quality. Cities seem like a missing link to R9's current effort.
- Please initiate a focused outreach to US mayors. Provide a directory of USEPA programs:
  - A list of grants available via regular emails
  - A way to implement (EMS)
  - A contact, liaison
  - A website, newsletter, conferences, speaker list to help us in our policy planning and decision making.
- Find a way to get additional funding t ICLEI to work with cities on climate change. Cities are the "first responders" for climate change, and we all need to support them. ICLEI is the best fit for organizing this work.