EPA United States Environmental Protection Agency

Climate and EPA's Multipollutant Assessment Efforts

Tom Long, Ph.D. – Physical Scientist
National Center for Environmental Assessment

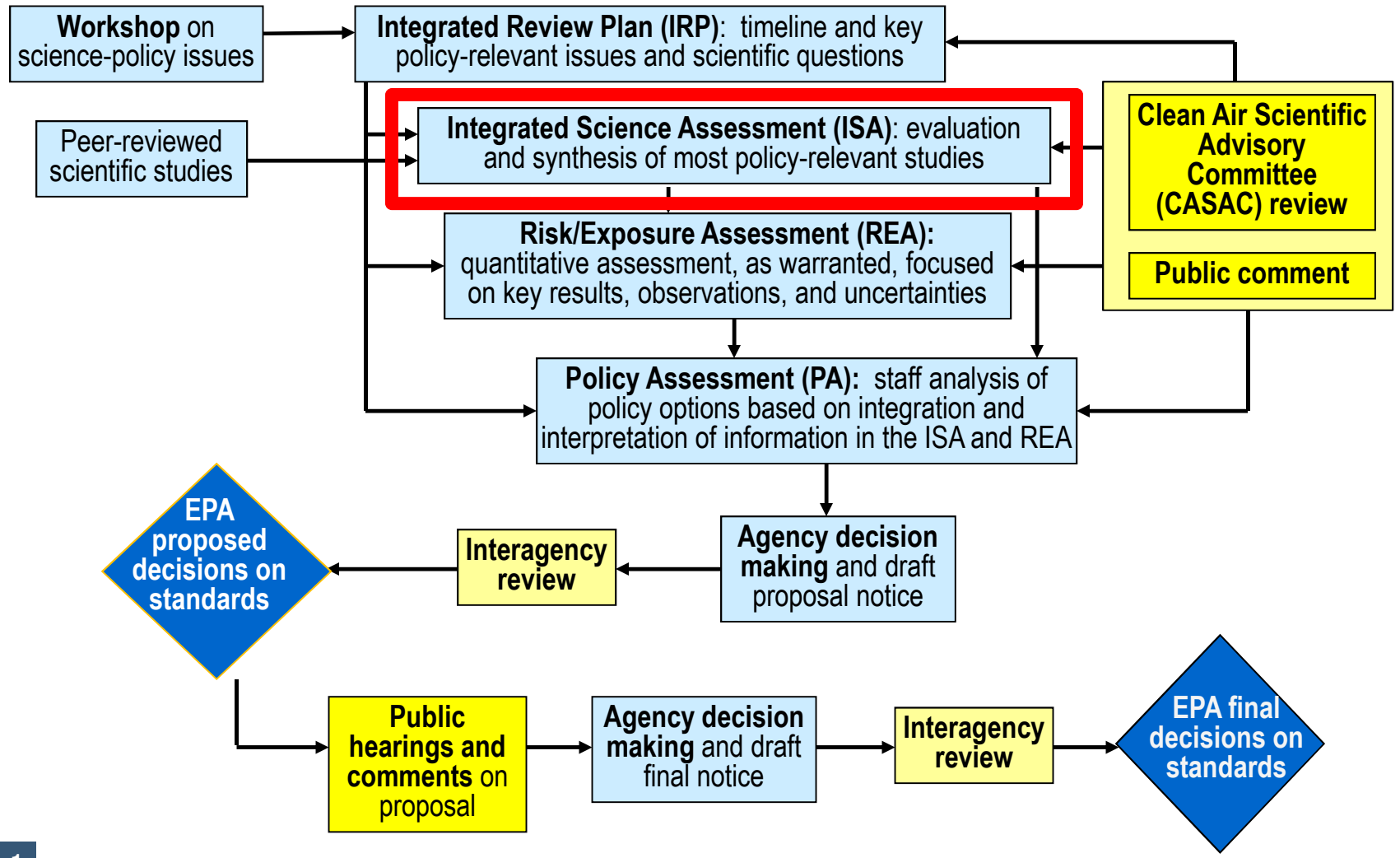
Disclaimer: This presentation does not necessarily reflect the views or policies of the U.S. Environmental Protection Agency.

Office of Research and Development
National Center for Environmental Assessment, Environmental Media Assessment Group, RTP, NC

November 13, 2014

EPA United States Environmental Protection Agency

NAAQS Review Process



EPA United States Environmental Protection Agency

Past Assessments

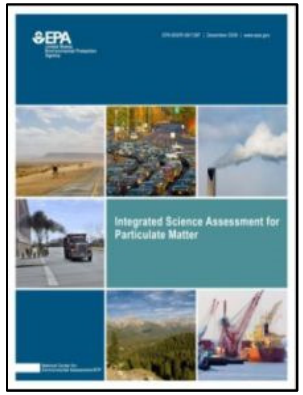
Integrated Science Assessments (ISAs)

- 2008 NO_X Health Criteria
- 2008 SO_X Health Criteria
- 2008 NO_X/SO_X Ecological Criteria
- 2009 PM
- 2010 CO
- 2013 O_3 and Related Photochemical Oxidants
- 2013 Pb (2^{nd} External Review Draft)

Climate

EPA United States Environmental Protection Agency

Past Assessments



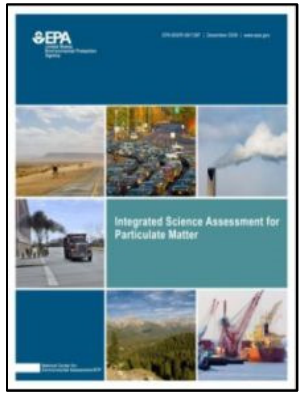
2009 ISA for Particulate Matter

Considerations

- PM direct effects through scattering and absorption
- PM indirect effects through cloud formation and lifetimes, and precipitation
- PM components
  - Sulfate, organic carbon, black carbon, biomass burning aerosols, nitrates, mineral dust
- Assessment based heavily on the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4)

EPA United States Environmental Protection Agency

Past Assessments



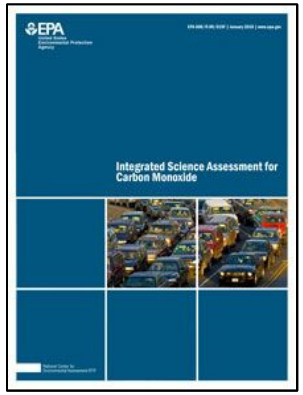
2009 ISA for Particulate Matter

Conclusions

- PM contributes to both warming and cooling
- Net climate cooling on a global scale with high degree of uncertainty
- Aerosol lifetimes and horizontal, vertical, and temporal distributions are very different from those of GHGs, so their effects do not simply off-set one another
- Radiative forcing from nitrates and dust are particularly uncertain
- Sub-global and regional effects of PM on climate are poorly understood

EPA United States Environmental Protection Agency

Past Assessments



2010 ISA for Carbon Monoxide

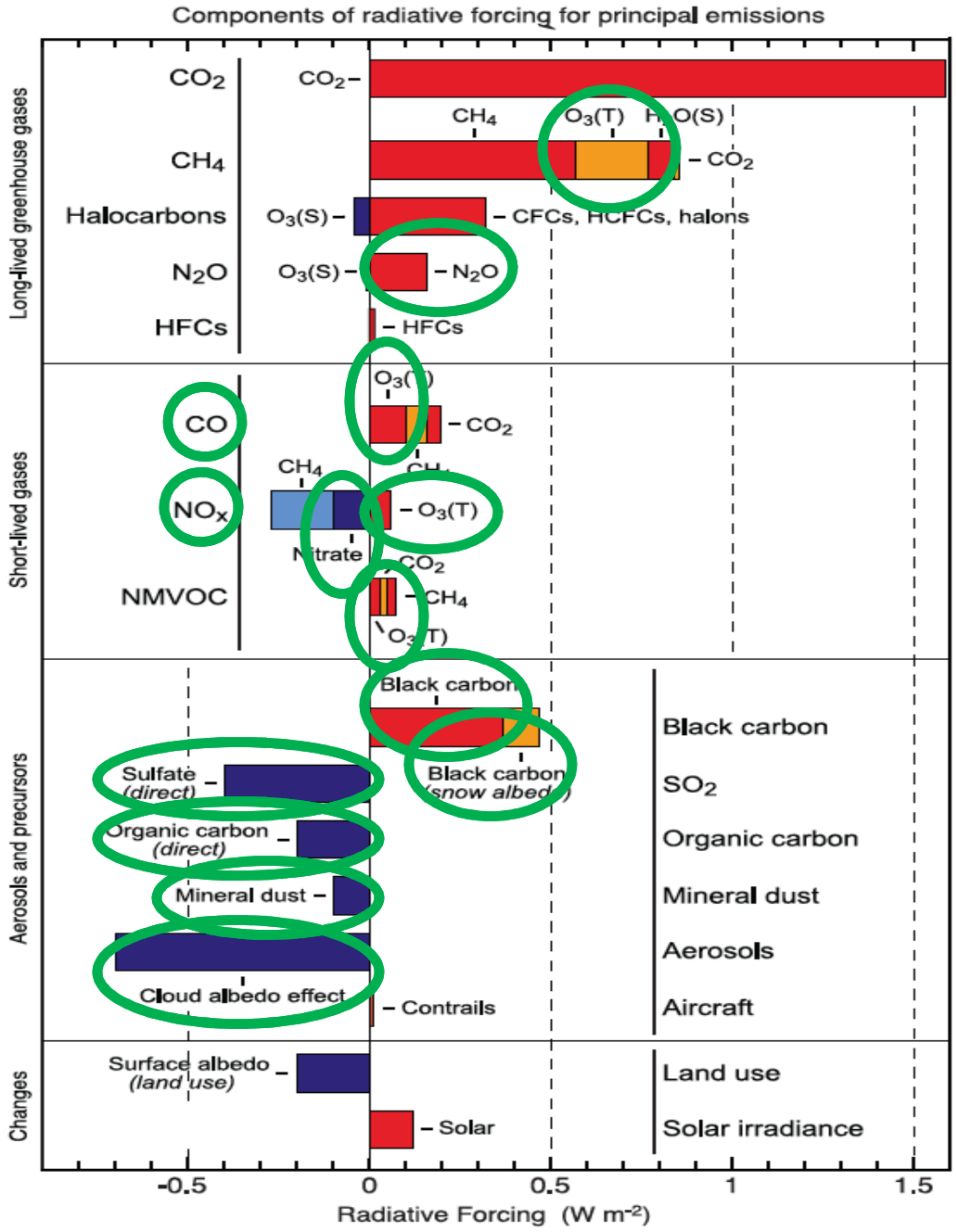
Considerations

- The effect of CO through longwave absorption
- The role of CO in the CO-CH_4-O_3-NO_X atmospheric chemistry cycles which alter the global concentrations and lifetimes of greenhouse gases
  - CO is a major atmospheric sink for OH, which increases the atmospheric lifetime of CH_4 and other gases
  - CO effects are most often assessed together with NO_X and volatile organic carbon (VOC) species

EPA United States Environmental Protection Agency

The criteria pollutants play an important role in radiative forcing attributed to

- long-lived GHGs,
- short-lived gases,
- and aerosols



Source: IPCC AR4, Figure 2.21, http://www.ipcc.ch/publications_and_data/ar4/wg2/en/spm.html

EPA United States Environmental Protection Agency

Multipollutant Motivation

2004 NAS Report:
"Air Quality Management in the United States"

Recommendation: Address multiple pollutants in the NAAQS review and standard setting process

"Although the committee does not believe that the science has evolved to a sufficient extent to permit the development of multipollutant NAAQS, it would be scientifically prudent to begin to review and develop NAAQS for related pollutants in parallel and simultaneously"

Note: There are currently no plans to attempt the development of multipollutant NAAQS for climate

EPA United States Environmental Protection Agency

Multipollutant Motivation

Multipollutant Science Documents (MSD)

- Serve as a companion document to inform the individual pollutant Integrated Science Assessments (ISAs)
- The ISAs have considered what information has been available on multipollutant interactions and the MSD will build on that; conceptually, not a major shift in the current NAAQS review process
- More explicit evaluation and formal review of the health and welfare effects of exposure to air pollutant mixtures

Proposed MSDs

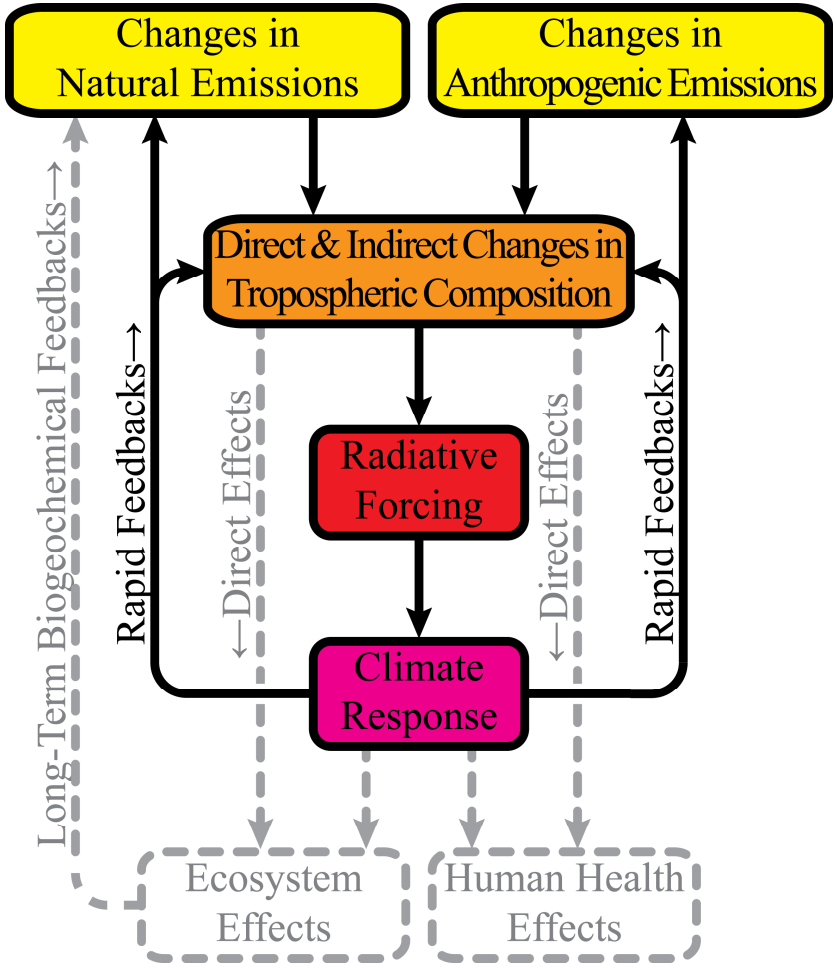
- Human Health Risk Assessment – Theme 2, Project 2
  - Ecology (Task 1)
  - Health (Task 2)
  - Climate (Task 3)

Early development and scoping stage; no formal timeline yet

EPA United States Environmental Protection Agency

Climate MSD Scope

- Climate MSD will evaluate the effect of criteria air pollutants on global and regional climate
- Climate MSD would allow NCEA to address climate issues using a more 'one atmosphere' approach
- Material covered in the Climate MSD would be consolidated in one location, providing a concise source of material to help inform future ISAs



EPA United States Environmental Protection Agency

Timeline and Current Status

- Expert Consultation held in May 2012
- Outside authors contributed chapters in summer 2013
- NCEA is integrating and editing draft chapters; will update to reflect IPCC AR5 and National Climate Assessment
- Anticipating peer input workshop for late 2015
  - New literature published through ~mid-2016
  - Literature reporting effects of multiple criteria pollutants
- Seek comment from Clean Air Scientific Advisory Committee and the public

EPA United States Environmental Protection Agency

Climate MSD Team

NCEA Staff

- Steve Dutton (task lead)
- Jeff Herrick
- Meredith Lassiter
- Tom Long
- Steve McDow
- Joe Pinto
- Kris Novak (multipollutant lead)
- Mary Ross (branch chief)

External Authors

- Daniel Jacob
- Jean-Francois Lamarque
- Ruby Leung
- Loretta Mickley
- Jason West