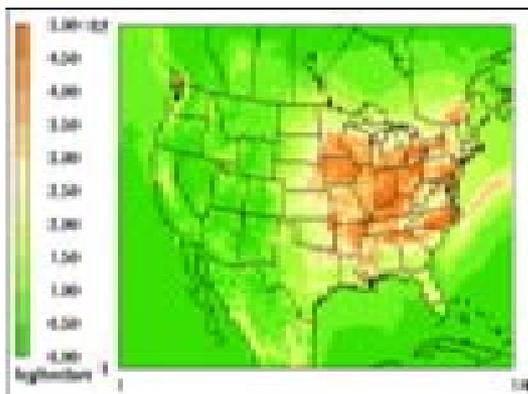
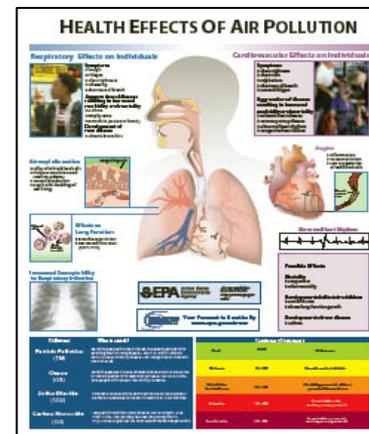


# Clean Air Research Program: Strategic Directions



Dan Costa  
National Program Director

SAB Meeting  
November 9-10, 2009

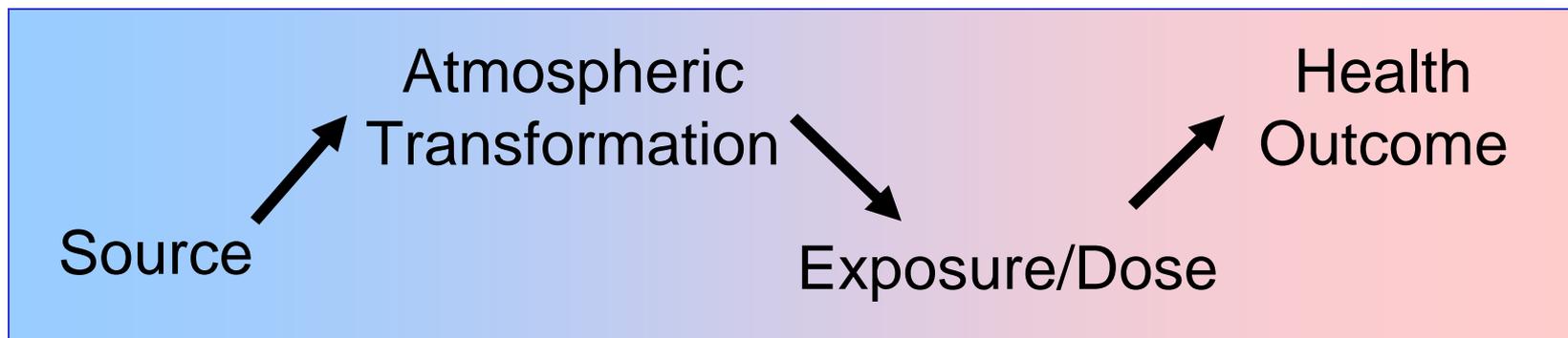


## *Recent Key Advances and Accomplishments*

- **Lung growth** retarded by air pollution
- Health risk impacts of **Eastern > Western PM**
- **Roadway** 'emissions' constitute a significant **MP exposure** burden with linked to multiple health outcomes (esp. re PM)
- **CMAQ** steadily evolves as a MP modeling tool with **finer grid** scales and enhanced **SOA** chemistry to improve client utility
- **Coarse PM** (like fine) alters cardiac function - esp. in susceptibles
- **AQ-health** researchers find common ground to advance PM conc-response risk estimates and dissect the role of components
- **Reduction** in ambient PM from 1980-2000 resulted in nearly half a year of increase in life-expectancy (**accountability**).

## ***Basic themes of the program are unchanged***

- Conduct & communicate air pollution science for stakeholder use
  - Address “all NAAQS all the time” and “what about” Air Toxics
- Multipollutant program will evolve from source to health paradigm...
  - Execution of ‘IMD’ near-road campaigns across L/C and partners
  - Promote the concept of ‘accountability’ in Air program areas



- Integration across L / C and science disciplines
- Opportunistic and proactive leveraging (public / private)

## ***Anticipated 2010-2014 Milestones and Challenges***

- Maximize the integration of AQ monitoring -health assessments
- Shift Air program emphasis from 60:40 research effort in support of NAAQS/ATs relative to multipollutant research to 40:60 effort
- Complete LV near road campaign; fully establish 'source to health outcome' paradigm in Detroit (2009-11); Raleigh (?) - 2012
- Devise MP research strategies to disentangle the impact of single pollutants (in support of NAAQS) and their interactions
- Establish a strategy for integration of "accountability" into fundamental Air research project structure
- Implementation support through improved models, tools and methods (esp. continuous)





# Global Change Research Program: Strategic Directions

Joel Scheraga  
National Program Director

SAB Meeting  
November 9-10, 2009

# ORD's Global Change Research Program: Well-Defined Mission

**Assess the potential consequences of *global change* – particularly climate variability and change -- in the U.S.**

Areas of focus:

air quality; water quality/aquatic ecosystems; human health

Provide timely and useful scientific information to **support decision making**

Focus on **adaptation** – to reduce risks posed by global change

New focus: Environmental and human health implications of alternative **mitigation** strategies

# New Directions: Mitigation

## Additional Congressional Appropriations

- **FY'08: \$3 million (one-time increase):** *“to support future rule making on greenhouse gases”*
- **FY'09: \$2 million (increase in base program):** *“Within the amount provided, \$18,365,000 is for Global Change Research, of which \$2,000,000 is directed to study Greenhouse Gas mitigation and adaptation strategies”*

# Global Change Research Program: Accomplishments

- **USGCRP:** Completed 2 major Synthesis and Assessment Products
- **Climate Change & Air Quality:** Assessment of the potential impacts of climate change on regional U.S. air quality, with a particular focus on ground-level ozone.
- **Climate Change & Water Quality:** Assessment of the impacts of climate change on aquatic invasive species and state-level management opportunities.
- **Climate Change & Water Quality:** Assessment of the potential impacts of climate change on combined sewer overflow events in the Great Lakes and New England Regions.
- **Decision Support Tools:**
  - **Integrated Climate/Land-Use Scenarios:** National-scale scenarios for the U.S. of population and housing density changes that are broadly consistent with climate change scenarios.
  - **Climate Change & Water Quality:** Online tool for assessing and managing the potential impacts of climate change on sediment loading to streams.
  - **Climate Change & Water Quality:** User's manual for BASINS Climate Assessment Tool that enables water resource managers to assess the influence of climate variability and change on water quantity and quality.
  - **Climate Change & Air Quality:** Continuing to support the enhancement, dissemination, and use of the 9-region MARKAL model of the U.S.

# Global Change and Air Quality: Interim Assessment

Released on April 17, 2009

***Fundamentally: Is climate change something we have to pay attention to going forward?***

***Answer: Yes***

***Climate change should be considered by air quality managers as they develop air pollution control strategies. Climate change has the potential to produce significant increases in ground-level ozone in many regions.***

2010 Assessment: What are the health implications of projected changes in air quality due to climate change?

# Global Change Research Program: Strategic Directions (2010-2014)

Continued emphasis on outcomes consistent with EPA's mission, and the statutory requirements placed on the U.S. Global Change Research Program (USGCRP):

- Assessment of the impacts of global change on air quality (focus on implications for statutory requirements under the Clean Air Act, and opportunities to adapt)
- Assessment of the impacts of global change on water quality/aquatic ecosystems (focus on implications for statutory requirements under the Clean Water Act and Safe Drinking Water Act, and opportunities to adapt)
- Supporting the statutory mandates on the USGCRP to produce periodic assessments of the potential impacts of climate change
- **New Strategic Direction:** Research and assessment of the environmental implications of alternative strategies for mitigating greenhouse gas emissions (including co-benefits of mitigation strategies and the potential for unanticipated negative impacts).

# Global Change Research Program: Anticipated Products

**Air Quality (FY2012):** Completion of *Global Change/Air Quality Assessment*, “Effects of *Global Change* on Air Quality in the United States” - in partnership with OAR/OAQPS.

**Water Quality (FY2010 – FY2013):**

- Assessment of OW needs and priorities relating to water quality and global change;
- Broad based, national scale assessment of water quality endpoints vulnerable to global change;
- Detailed watershed-based, stakeholder-driven studies focused on local issues and specific management solutions for addressing global change;
- Detailed studies of the potential impacts and opportunities for adapting water infrastructure and the built environment, and
- Development of broadly applicable decision support tools to increase the capacity of OW clients to assess and manage the impacts of global change on water and watershed systems.

**CCSP (FY2012: As mandated by 1990 Global Change Research Act):**

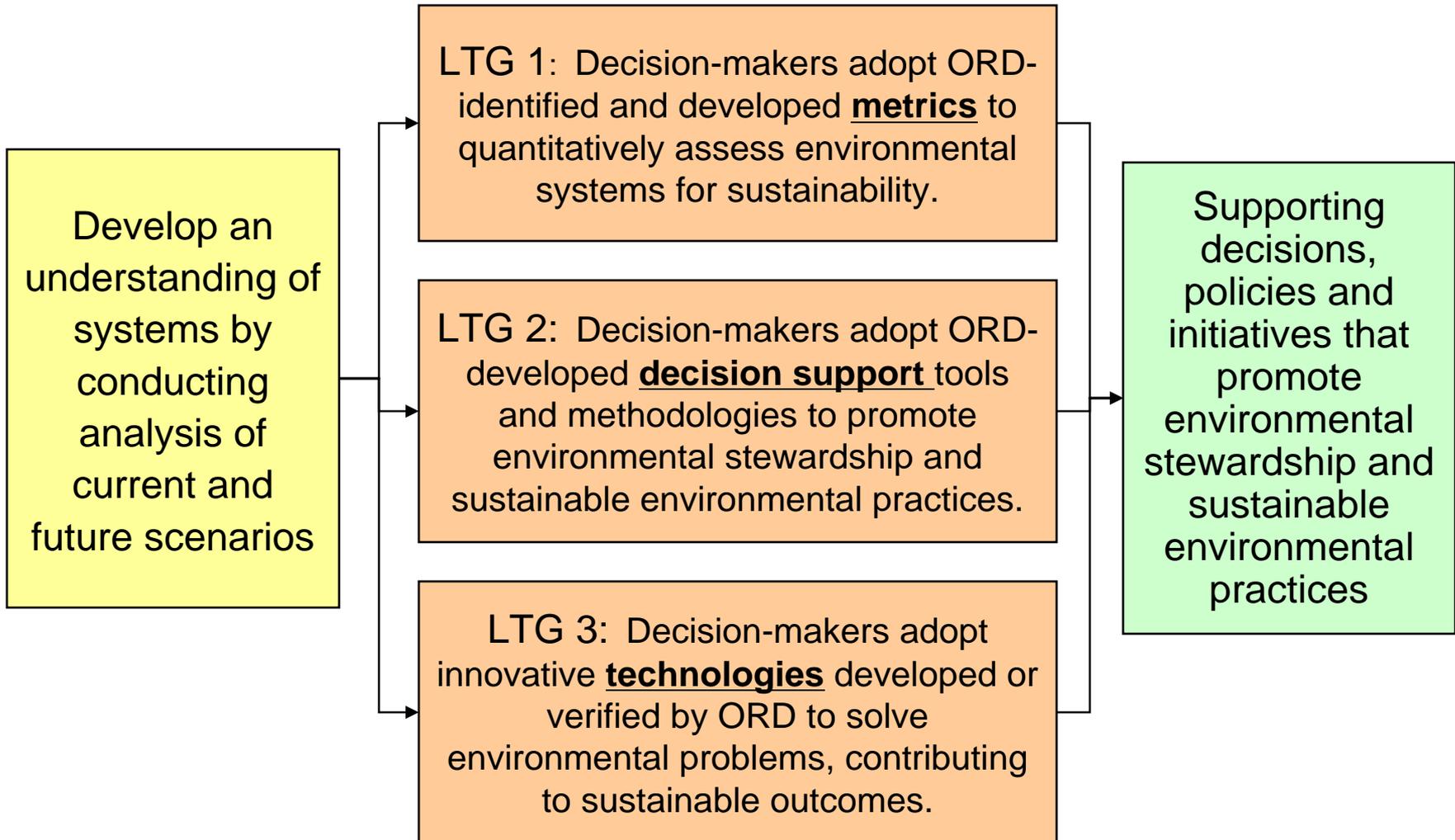
- Completion of EPA contribution to third CCSP “National Assessment”

# **2009 National Research Council Report: “Informing Decisions in a Changing Climate”**

**“The Environmental Protection Agency (EPA) should expand its climate-related decision support programs to serve more regional and sectoral constituencies.”**

# Science and Technology for Sustainability Research Program: Strategic Directions

Alan Hecht  
Director for Sustainable Development



# Accomplishments – 1

- BOSC mid-cycle review rating of “Exceeds Expectation”
- Analyzed strengths and weaknesses of LCA-based tools for assessing environmental impacts of biofuel production
  - ✔ See “Gap analysis of life cycle-based tools for assessing environmental impacts of biofuels” (80 pages)
- Lead interagency study sustainability biofuel metrics; completed inventory of published criteria
- With NCEA, prepared outline of 2010 Report to Congress
- Published EPA report on sustainable watershed management
  - ✔ See “Using economic incentives to manage storm water runoff in the Shepherd Creek Watershed – Part 1”

## Accomplishments – 2

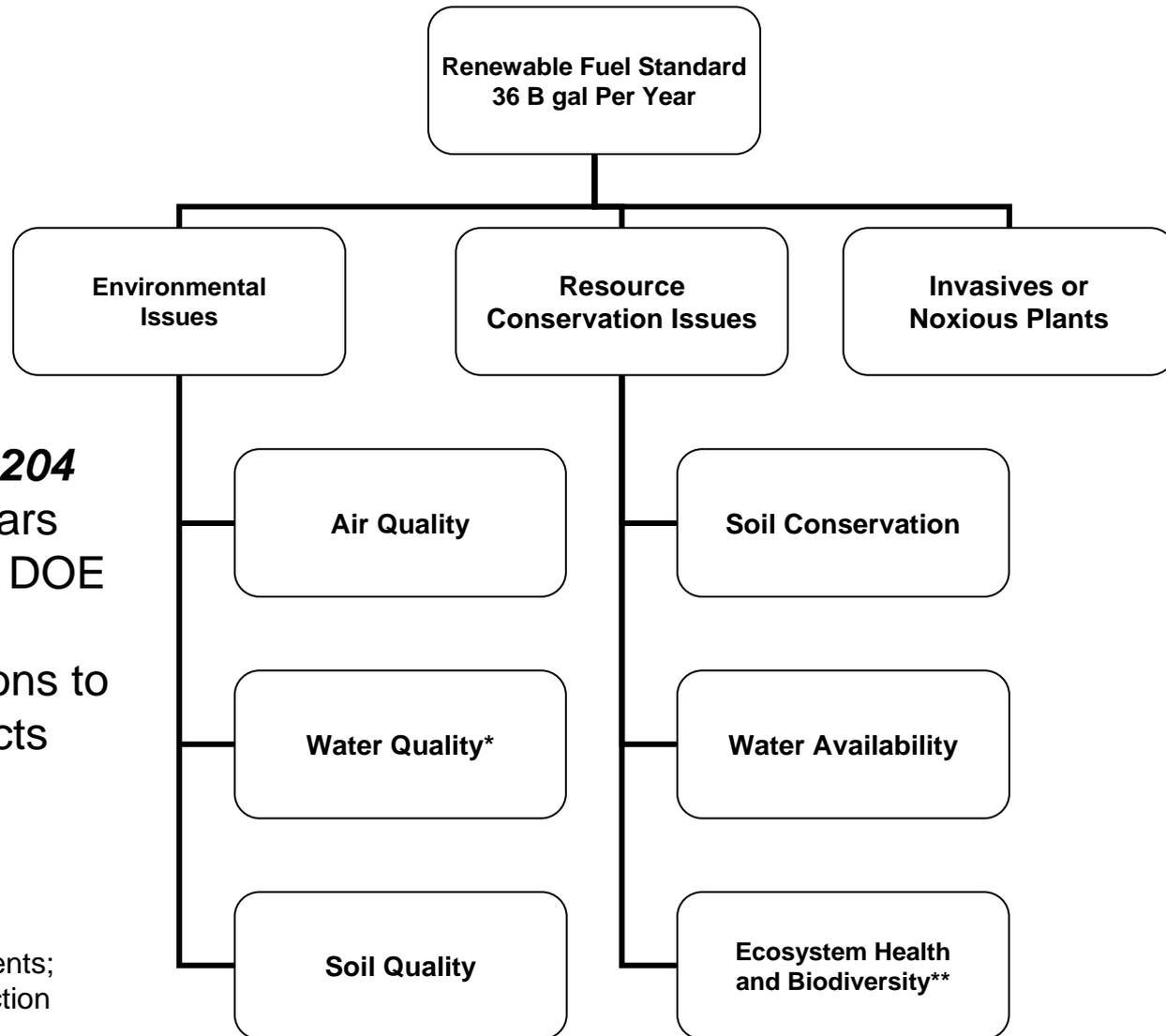
- With Region 8, Park Service and other stakeholders, completed 1<sup>st</sup> phase of San Luis Basin metric study
  - ✔ See San Luis Basin Sustainability Metrics Project (380 pg.)
- Launched new dialogue on sustainability and systems research
  - ✔ See Viewpoint article in *ES&T*: “EPA@40”
- Awarded 43 new P3 grants for 6<sup>th</sup> annual sustainability expo (2010)
- Identified STAR Fellowships sustainability topics focusing on green engineering/chemistry/materials, energy (multimedia pollution prevention) and environmental behavior and Decision-Making
- Incorporated language on technology lifecycle impact considerations into SBIR RfA
- SBIR: Ecovative Design developing an environmentally- friendly mycelium-based insulation material. ✔ See “**Staying cool: green insulation gets warm reception**” article on Greensulate, *Scientific American* (5/28/08)

# Actions on Biofuels

- Led EPA workshop (October 8-9, 2009) to assess needs of Program and Regional Offices and priorities for 2010 funding
- Co-chairing with USDA and DOE interagency to develop sustainable biofuel criteria and indicators
- Leading Environmental Health & Safety work group of Biomass R&D Board
- ORD/ETV partnering with OSWER to assess performance of existing tank technologies with different blends
- For Report to Congress, established interoffice steering committee, completed outline and conceptual models
- Advising Chesapeake Bay Commission on environment consideration for biofuel production

\$5 million in the FY2010 President's Budget  
for new biofuel research

# EISA § 204 Report to Congress



## Key Features of EISA § 204

- Report required every 3 years
- In consultation with USDA, DOE
- Current and future impacts
- Recommendations for actions to address any adverse impacts

\* Includes: Hypoxia; Pesticides; Sediments; Nutrients; Pathogens; and Acreage/Function of waters

\*\* Includes Forests, Grasslands, Wetlands and Aquatic Ecosystems



# Proposed Strategic Directions: 2010–2014

- Partner with Programs and Regions to advance research supporting sustainable biofuel production; Partner with Oak Ridge
- Develop scenarios for current and next generation of feedstocks
- With OPEI, OSWER, OPPTS and states, support LCA and research on sustainable supply chain to advance materials management (Vision 2020 Report)
  - Industrial applications, infrastructure, green building, and sustainable urban development
- Partner with Regions to increase regional development and application of sustainability metrics, with Puerto Rico as next pilot
- Partner with NSF on special issue *Journal of Industrial Ecology* (December 2009) issue on applications of material flow analysis.
- Launch national dialogue on “EPA@40,” including systems-based sustainability science and ORD transformation

# TRANSFORMATION OF ORD SCIENCE



“The focus on sustainability research recognizes the changing nature of environmental challenges that society faces today. In the past EPA focused its actions more directly on specific pollutants, their sources, and causes. More recently, and into the future, the Agency must provide information to help address a broader set of environmental issues involving population and economic growth, energy use, agriculture, and industrial development. Capably addressing these questions, and the tradeoffs they will entail, requires the new systems-based focus on science and analysis outlined in the Sustainability Research Strategy.”

**October 2007**

# Evolution of U.S. Environmental Policy

	<b>19<sup>th</sup> Century</b>	<b>20<sup>th</sup> century</b>	<b>21<sup>st</sup> century</b>
<b>Focus</b>	Land conservation	Human health risk; Media/site/ problem specific	Complex regional/ global problems
<b>Outcome</b>	Land preservation	Pollution Control; Manage anthropocentric ecological risk	Global sustainable development
<b>Principal Activity</b>	Land/water regulation/simple contaminant controls	Compliance/ remediation/ technological emphasis on problem solving	Integration of social, economic, and technological information for holistic problem solving
<b>Economic Focus</b>	Value of land use and industrial development	Cost minimization	Strategic investments/long-term societal well-being
<b>Regulatory Activity</b>	Low	Heavy	Flexible, including market-based incentives
<b>Conceptual Model</b>	Expansion vs. preservation	Command-and-control	Systems/life cycle approach
<b>Disciplinary Approach</b>	Disciplinary/insular	Multidisciplinary	Interdisciplinary/ Integrative

# 2010 Outcomes – 1

- Biofuels Report to Congress due December 2010
- Review literature on environmental and health impacts of biofuel production and use
- Develop scenarios to project the impacts of next generation of biofuels
- Develop matrix of criteria and indicators measuring sustainable biofuel production. Host spring stakeholder workshop
- Work with OPPTS, OSWER, OPEI and states, develop pilot projects showcasing LCA of materials management and reduction of environmental impacts
- March North American workshop on accessing data for LCA biofuel analysis

## 2010 Outcomes – 2

- Develop partnerships with federal land agencies and local decision makers to use sustainability metrics for environmental management in San Luis Valley (Aiming for EPA-Park Service Agreement)
- Continue regional case studies to develop and apply sustainability metrics and initiate Puerto Rico Project
- Solicitation for STAR Green Schools (Human Health Program)
  - Examining green schools, children's health, and school performance

**PLACEHOLDER**

Number 16 Economics and  
Decision Sciences