

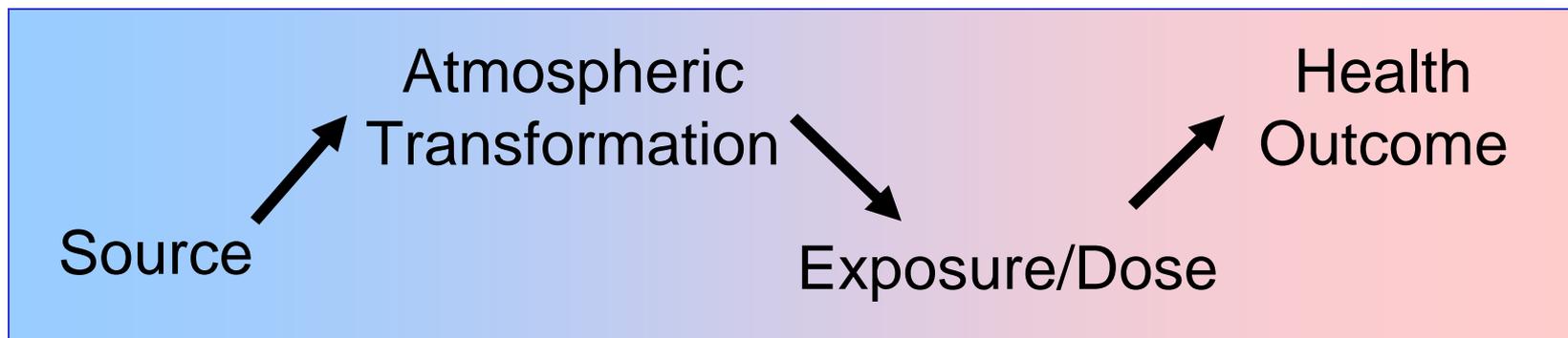


## *Recent Key Advances and Accomplishments*

- 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

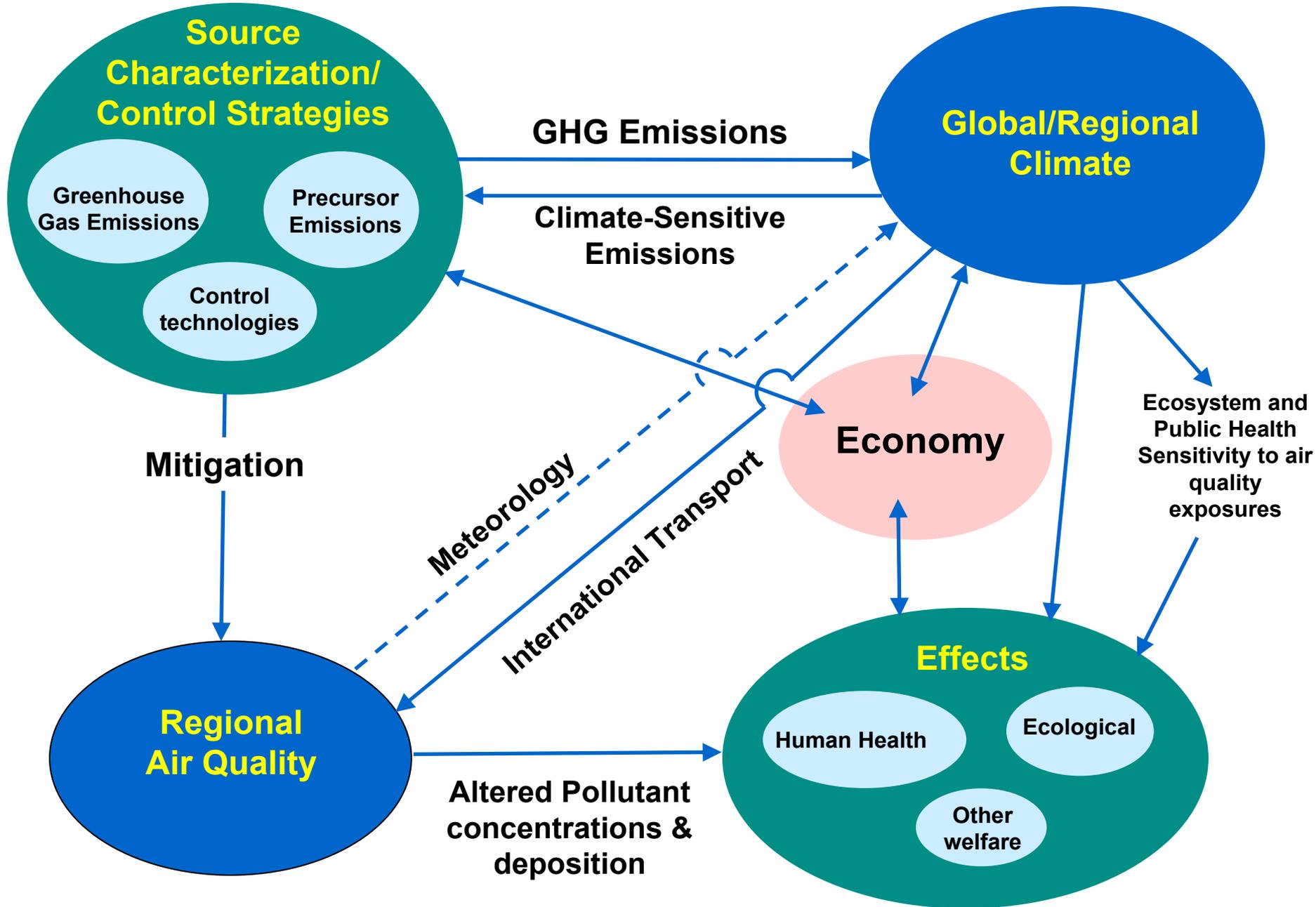


- Integration across L / C and science disciplines
- Opportunistic and proactive leveraging (public / private)

## ***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)

# Future: Climate & AQ Mgmt – Global CC↔Clean Air





# 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):**

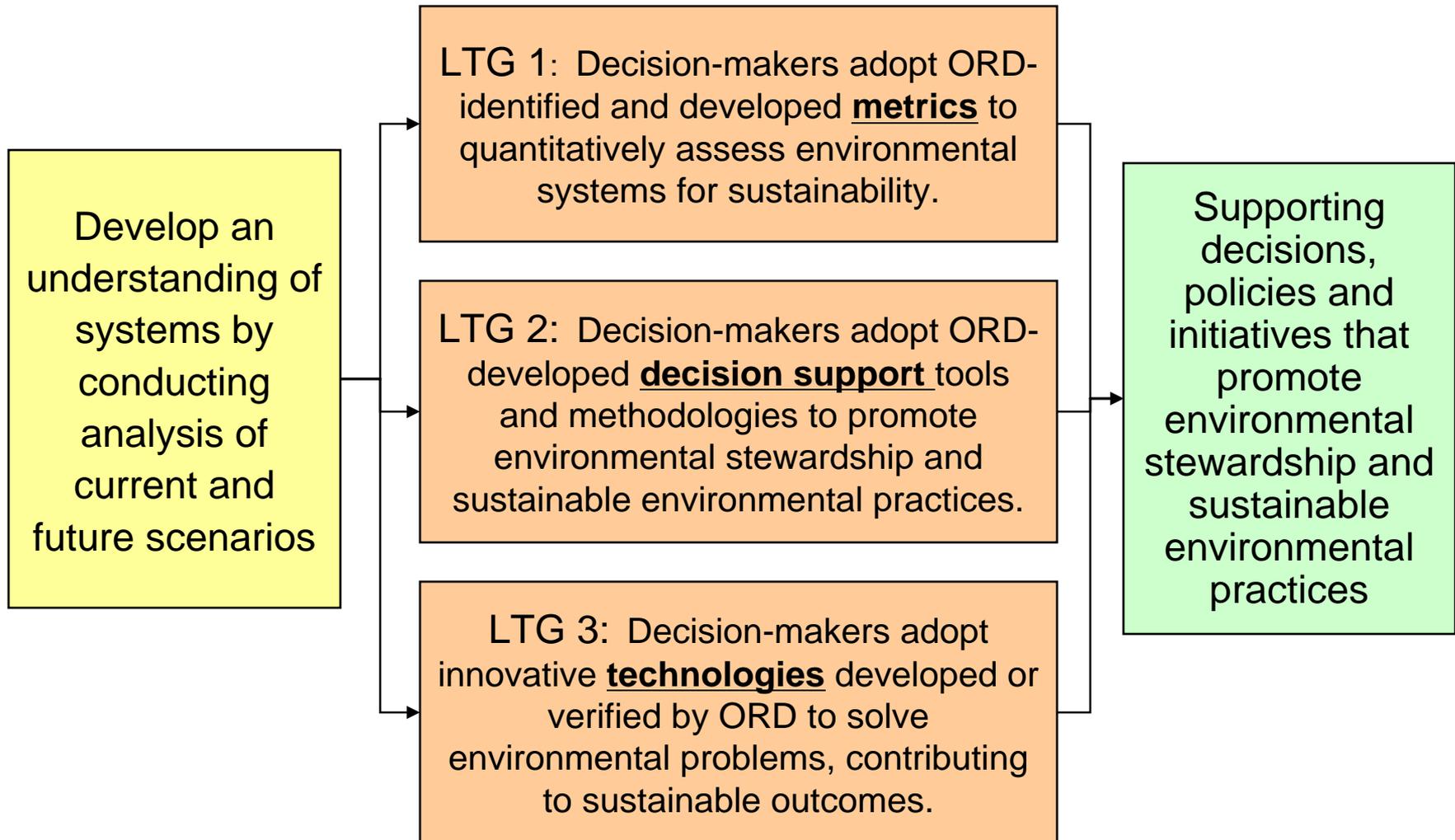
- Completion of EPA contribution to third CCSP “National Assessment”

# **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

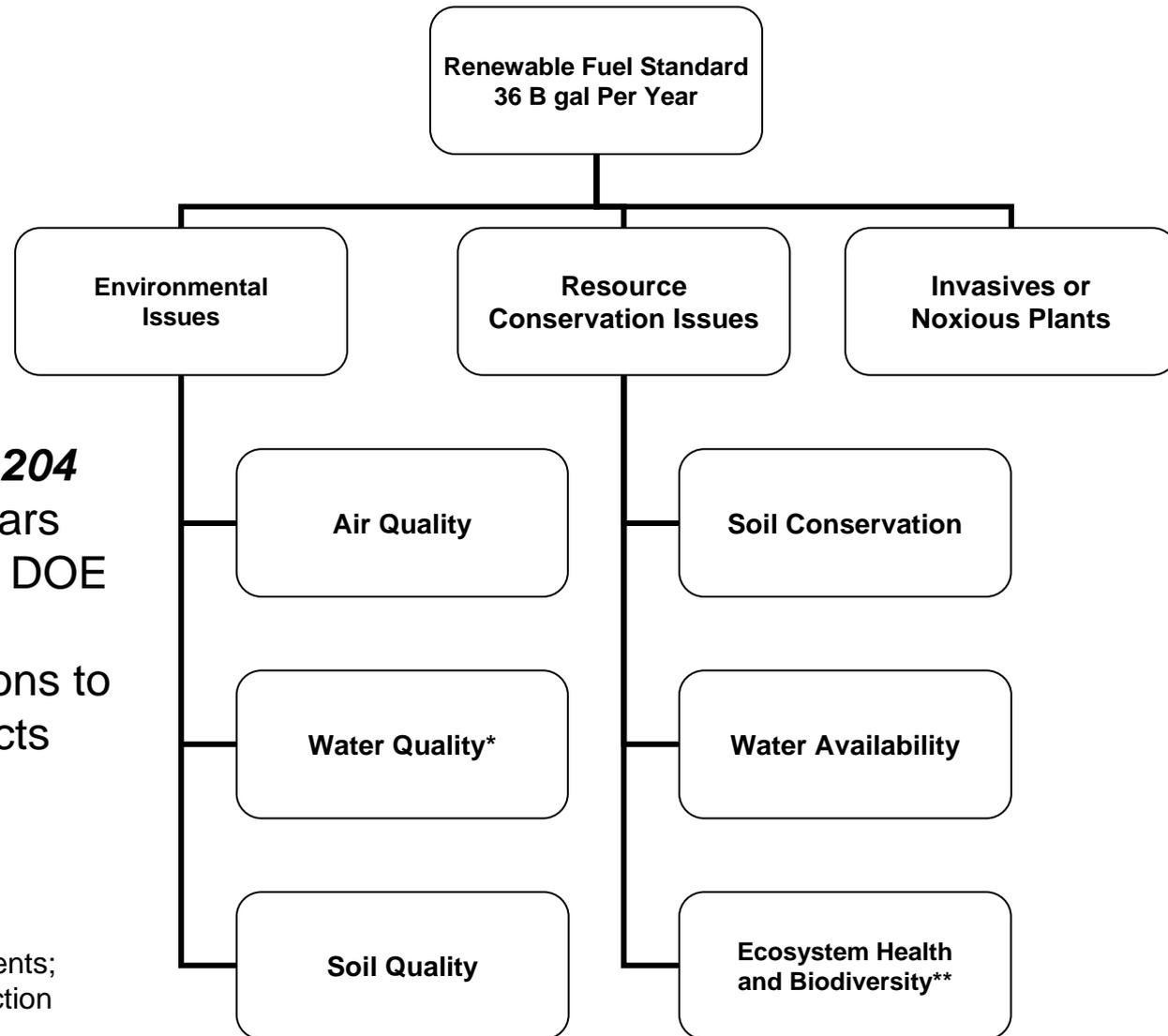
- With Region 8, Park Service and other stakeholders, completed 1<sup>st</sup> phase of San Luis Basin metric study
  - ✔ See San Luis Basin Sustainability Metrics Project (380 pg.)
- Launched new dialogue on sustainability and systems research
  - ✔ See Viewpoint article in *ES&T*: “EPA@40”
- Awarded 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



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# SAB Meeting on Strategic Research Directions—Economics and Decision Sciences

Dr. Chris Dockins, Director  
Science Policy and Analysis Division  
National Center for Environmental Economics

November 9, 2009



# Outline

- Economics and Decision Sciences (EDS) Program
- NCEE Internal Research
- Other Upcoming Activities
  - Workshops and Products
  - PACE Survey
  - Children's Health



# EDS Program

- Prior to 2008, ORD's National Center for Environmental Research (NCER) was responsible for administering and funding the EDS program
- The program was moved in FY2008 from NCER to OPEI under the Regulatory/Econ Management and Analysis program project
- Thirty-eight (38) active grants were moved from NCER to NCEE
- When the EDS program moved funding was cut by 50% (\$1million) and cut again due to 40 percent OPEI-wide cut
- OPEI absorbed a substantial cut in the FY2009 continuing resolution
- Funding: FY2008 Obligations: \$0 M, FY2009 Likely Enacted: \$0.2 M, FY2010 President's Budget: \$1M



# Current/Future Awards

- Funded seven grants (out of 22 applications) to support environmental economics workshops from 2008 base NCEE research program
  - some single event, topic-focused (land use, meta-analysis, experimental methods, micro-econometrics)
  - others multi-year to support dissemination of research findings (Heartlands, Camp Resources, NBER Summer series)
- Recommended six awards (out of 11 applications) for dissertation/early career research in environmental economics from 2009 EDS competitive solicitation
  - “...for gathering data for use in doctoral dissertations and other early career research in those areas of environmental economics involving pollution control.”
- Recommended three awards (out of 23 applications) for research on market mechanisms in 2009 EDS competitive solicitation
  - “...normative or positive research in the design of policies for pollution control using market mechanisms, particularly second-best and piecemeal approaches to regulation as well as multiple, hybrid, or adaptive policies to control one or more externalities or other problems.”



# NCEE Internal Research

- NCEE economists and scientists engage in research to fill gaps in knowledge, often with support from other EPA offices.
- NCEE staff research continues to present research at professional conferences, and to publish in peer reviewed journals, producing between 20-30 papers per year in economics and risk science fields
- NCEE added 6 entries in its Working Paper series in FY 2009 (there are 73 papers total in the series)
- Ongoing research includes efforts to:
  - account for uncertainty in the economic analysis of climate change policies
  - conduct a national scale assessment of the environmental justice implications of air pollution regulation
  - link EPA's air quality data with the National Center for Health Statistics survey data
  - analyze how regulation-based induced technological change impacts emissions and marginal abatement costs over time
  - measure economic benefits of reducing air toxics emissions



## Other Upcoming Activities: Workshops and EDS Products

- Hosted Market Mechanisms workshop in April 2009, with presentations by EDS recipients and other researchers on use of incentives on
  - fuel economy, water quality, and land use
  - distributional consequences of using market incentives
  - panel discussion on the role of market mechanisms and incentives to climate change
- Planning April 2010 workshop showcasing EDS-funded research on the Economic Benefits of Information Disclosure
- Compiling list of all publications resulting from EDS program and citation metrics to help communicate and evaluate results of program
- Compiling results of EDS benefits transfer grants as they are completed over next two years to help support regulatory development efforts



# Other Upcoming Activities: Pollution Abatement Costs and Expenditures (PACE) Survey

- Survey of ~20,000 U.S. manufacturing facilities - data on overall pollution abatement expenditures (by type and media), but not designed for collecting cost information on impacts of specific regulations
- Census conducted and funded the PACE Survey from 1973-1994; Census collected PACE data in 1999 and 2005 with funding by EPA
- EPA uses PACE data in some regulatory analyses and for periodic reports on national or program costs (e.g., Cost of Clean and Environment Investments), CAA 812 Retrospective Cost Analysis, EPA's Strategic Plan)
- Government & academic researchers use PACE data to analyze the impact of environmental regulations on important economic and environmental outcomes (e.g., job growth; competitiveness; environmental performance; opening and closing of manufacturing facilities; and productivity growth)
- Future of PACE
  - Collect PACE on more routine basis – goal of annual reports, next to be 2009 or 2010 data
    - SAB-EEAC has been very supportive of EPA's efforts to collect annual PACE data
  - Explore use of PACE survey to study GHG-related control and monitoring costs
    - Proposal for funding support included in FY 2010 President Budget
    - Opportunity to collect information at outset of potential new program



## Other Upcoming Activities: Children's Health Protection

- Framework using *Handbook for Children's Health Valuation* (2003)
- Collect and critically review economics literature on methods and empirical estimates (e.g., of willingness-to-pay) to reduce children's environmental health risks
- Targeted development of new valuation data and methods, through:
  - Applied research and data analysis from outside experts
  - NCEE in-house research and analysis
  - Contractor efforts such as new cost-of-illness estimates for application in Agency analyses
- Initiate longer-term efforts to develop new data and methods, such as:
  - Competitive solicitations supported by EDS and other programs (e.g., Office of Children's Health)