EPA
United States
Environmental Protection
Agency

ORD/EPA and Sustainability Overview to NAS Committee

Alan D. Hecht

December 15, 2010

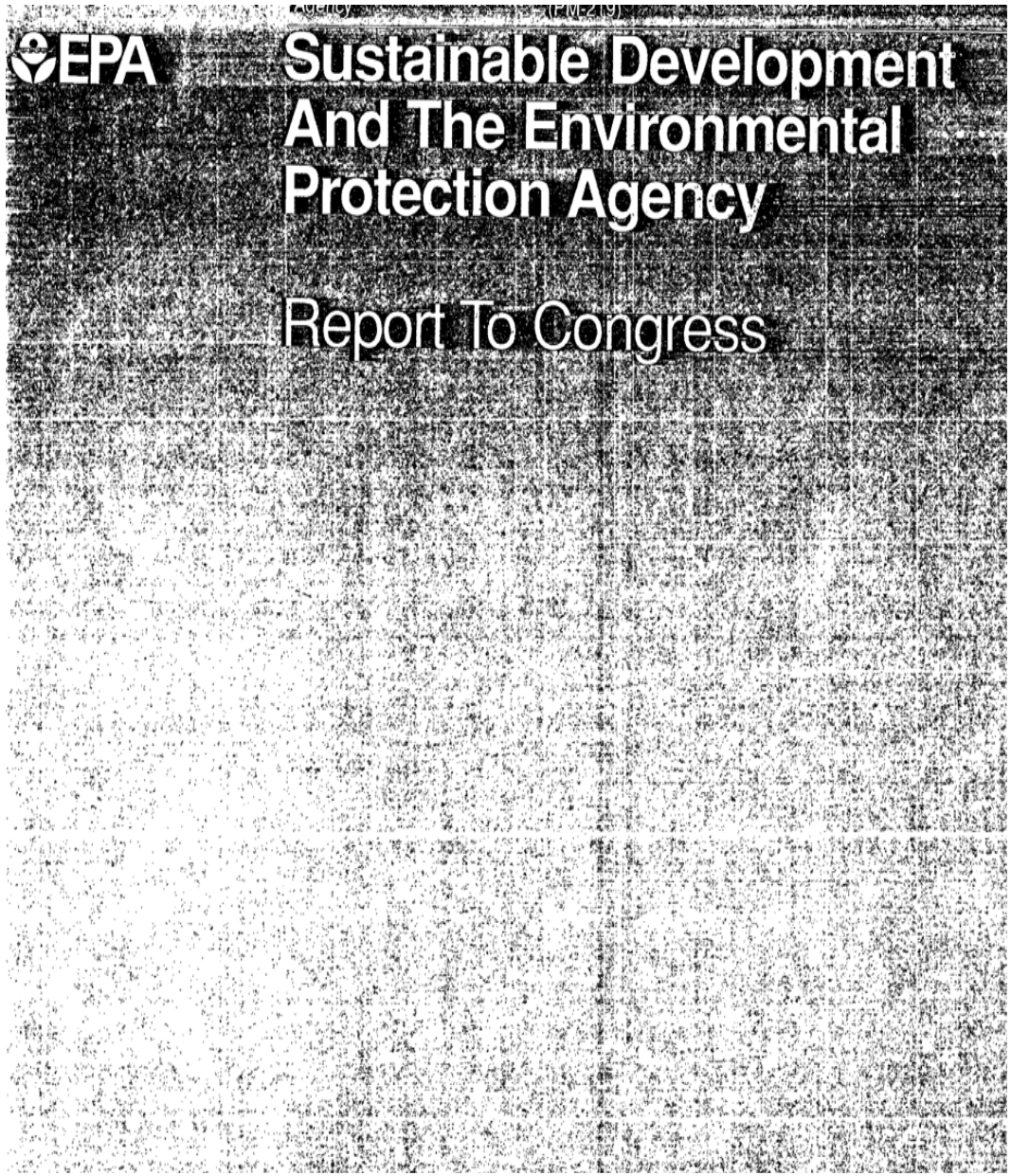
Contributions from Joseph Fiksel (EPA),
Peter Paul de van Wijs (WBCSD/formerly DOW)

EPA United States Environmental Protection Agency

Outline

- 1993 EPA Report to Congress
- 1998 House Science Committee Report "Unlocking the Future"
- Phase 1 (2003 – 2005): Laboratory for Sustainability and Cooperative Network
- Phase 2 (2005 – 2007): ORD Research Strategy; Everyday Choices
- Phase 3 (2007 – 2010): Defining Issues of National Significance
- Phase 4 (2010 – 2012): Path Forward and ORD Linkages
- Green Race to 2050

EPA
United States
Environmental Protection
Agency



United States Environmental Protection Agency

Sustainability Research New Challenges

While acknowledging the continuing need for science and engineering in national security, health, and the economy, the challenges we face today cause us to propose that the scientific and engineering enterprise ought to move toward center stage in a fourth role: that of helping society make good decisions. We believe this role for science will take on increasing importance as we face difficult decisions related to the environment.

– House Committee on Science,
Unlocking Our Future, 1998

EPA
United States
Environmental Protection
Agency

Phase I (2003–2005): Setting the Vision

- First attempt to make Sustainability *an integrating concept* across ORD; Advanced sustainability paradigm

- Used concept of *living laboratories* (regional and state projects) to transfer sustainability concepts to users
  - launched Collaborative Science and Technology Network for Sustainability (CNS)
  - funded dozens of CNS projects that connected diverse sets of partners including universities, federal agencies, and cities

- Organized research to focus on metrics, decision support tools, and technology development

EPA
United States
Environmental Protection
Agency

2003 Sustainability Paradigm

- Systems approach to managing inputs to the environment
- Assessment: anticipating and evaluating impacts
- Management: building resilient systems, developing technologies and new processes
- Support: developing metrics, decision and management tools

CNS: Selected Projects

(Collaborative S&T Network for Sustainability)

Sustaining Multiple Benefits in Large River Floodplains

Decision Model for Urban Water Reuse

Cuyahoga Sustainability Network

Integrating Water Supply Management and Ecological Flow Requirements

Efficient Materials and Energy Use: Understanding Economic Benefits

Bringing Global Thinking to Local Sustainability Efforts for the Boston Region

Using Market Forces to Implement Sustainable Watershed Management

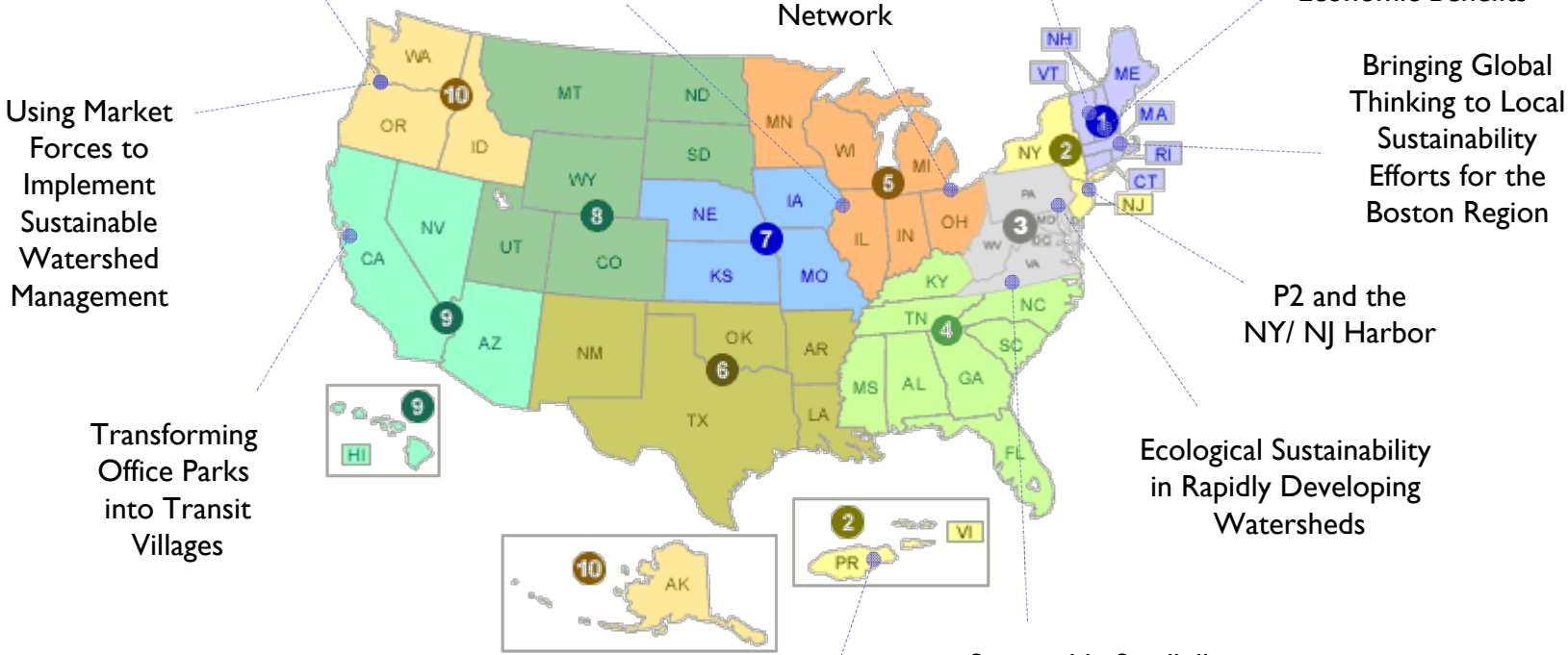
P2 and the NY/ NJ Harbor

Transforming Office Parks into Transit Villages

Ecological Sustainability in Rapidly Developing Watersheds

Sustainable Sandhills: A Plan for Regional Sustainability

Sustainable Land Use in Puerto Rico



EPA
United States
Environmental Protection
Agency

Phase 2 (2005-2007): Developing a Sustainability Research Strategy

- Transitioned Pollution Prevention and New Technologies Research Program into the Science and Technology for Sustainability Research Program

- Attempted to coordinate across ORD and EPA (*Everyday Choices)*

United States Environmental Protection Agency

Everyday Choices:

EPA Report on Stewardship and Sustainability

- **Air:** Sustain clear and healthy air
- **Ecosystems:** Protect and restore ecosystem functions, goods and services
- **Energy:** Generate clean energy and use it efficiently
- **Land:** Support ecologically sensitive land management and development
- **Materials:** Use materials efficiently and shift to environmentally preferable materials
- **Water:** Sustain water resources of quality and quantity required for particular use

Transformation of ORD Science

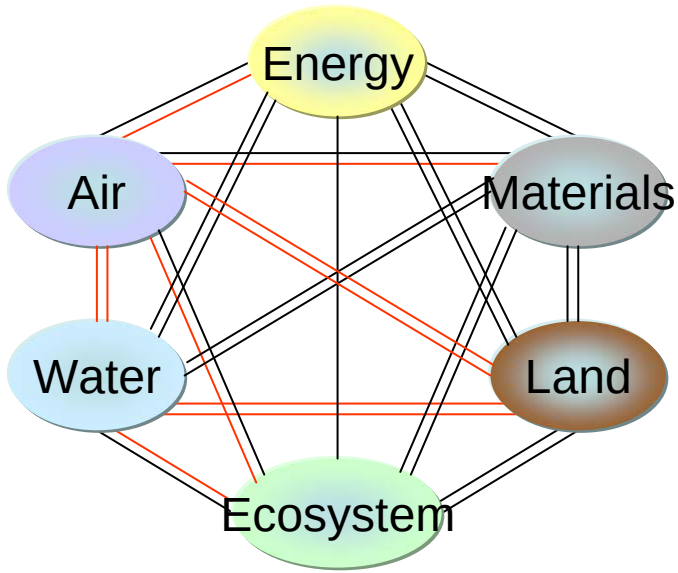
"In the past EPA focused its actions more directly on specific pollutants, their sources, and causes. More recently, and into the future, the Agency must provide information to help address a broader set of environmental issues involving population and economic growth, energy use, agriculture, and industrial 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

EPA
United States
Environmental Protection
Agency

Core Elements of the Sustainability Research Strategy

- Systems research
- Decision support tools
- Technology and industrial design/materials
- Future scenarios
- Sustainability Indicators



United States Environmental Protection Agency

SAB Recommends Focused on National Problems

"The Committee feels that the careful selection of multifaceted research projects within the [STS Multi-year] Plan is helpful to the adoption of the sustainability paradigm both within and outside the Agency. EPA has a prominent leadership mandate in the sustainability arena and its research projects and their products are important for adoption of the paradigm. *The projects should have visibility and be nationally compelling. The research* products should strategically integrate into the other 16 multi-year plans across the Agency and allow the Agency to guide other Federal agency research on sustainability" *(italics added)*.

– SAB Letter to EPA Administrator June 2007

United States Environmental Protection Agency

SAB Calls for Appropriate Workforce and New Management Structure

"Although the science in the Plan is sound, it is unlikely that the Agency's sustainability outcomes will be achieved within five years. Success in that time frame requires greater resources, both human and financial. Obviously, a workforce with experience and expertise relating to sustainability is necessary. *A management structure aligned with a systems-based approach to environmental decision-making is also vital" (italics added).*

– SAB Letter to EPA Administrator June 2007

(These recommendations are being addressed in the Path Forward, 2010)

EPA
United States
Environmental Protection
Agency

Conclusion of Talk Given in 2006

- EPA is an innovative and clever agency.
- EPA is practicing stealth sustainability.
- EPA can be more effective as an agency, drive greater innovation, and achieve better results by making sustainability a more visible environmental goal.
- EPA needs sustainability roadmap and metrics.

EPA
United States
Environmental Protection
Agency

Phase 3 (2007-2010): Focusing on National Issues

- ORD responded to SAB and BOSC guidance and begins to apply sustainability research activities to areas of national significance. Selected sustainable biofuels as one initial example
- ORD began to integrate and focus programs on other areas of national significance – i.e., Safer Products for Sustainable World.

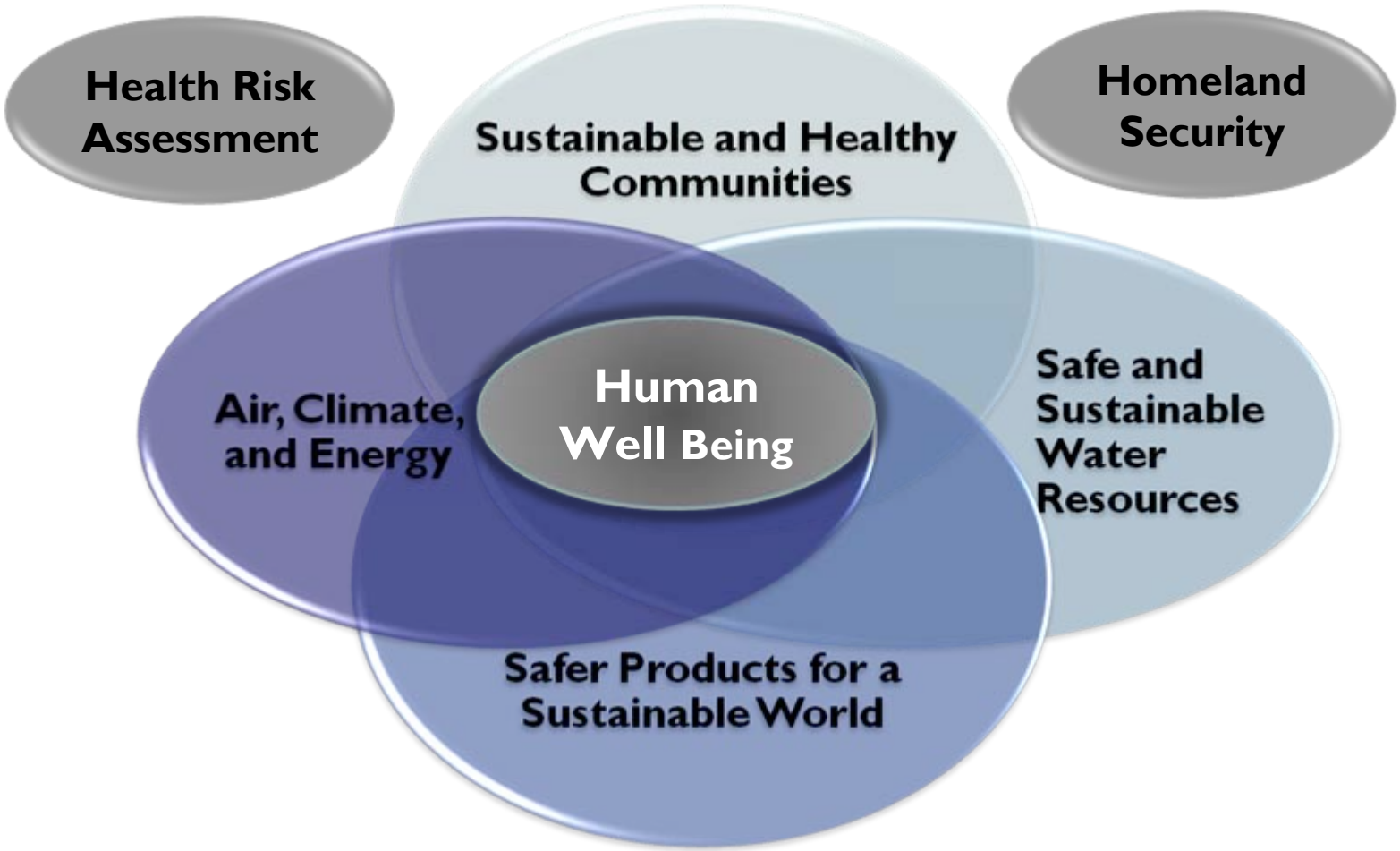
United States Environmental Protection Agency

Phase 4 (2011-2012): The New Path Forward

- ORD AA Paul Anastas makes sustainability ORD's "true north"
- ORD organized sustainability training for senior managers, Sustainability 101 for all staff being developed
- ORD developed research linkages/themes around ITR and systems analysis
- EPA launches cross program activities related to sustainability
- Administrator announces NAS study

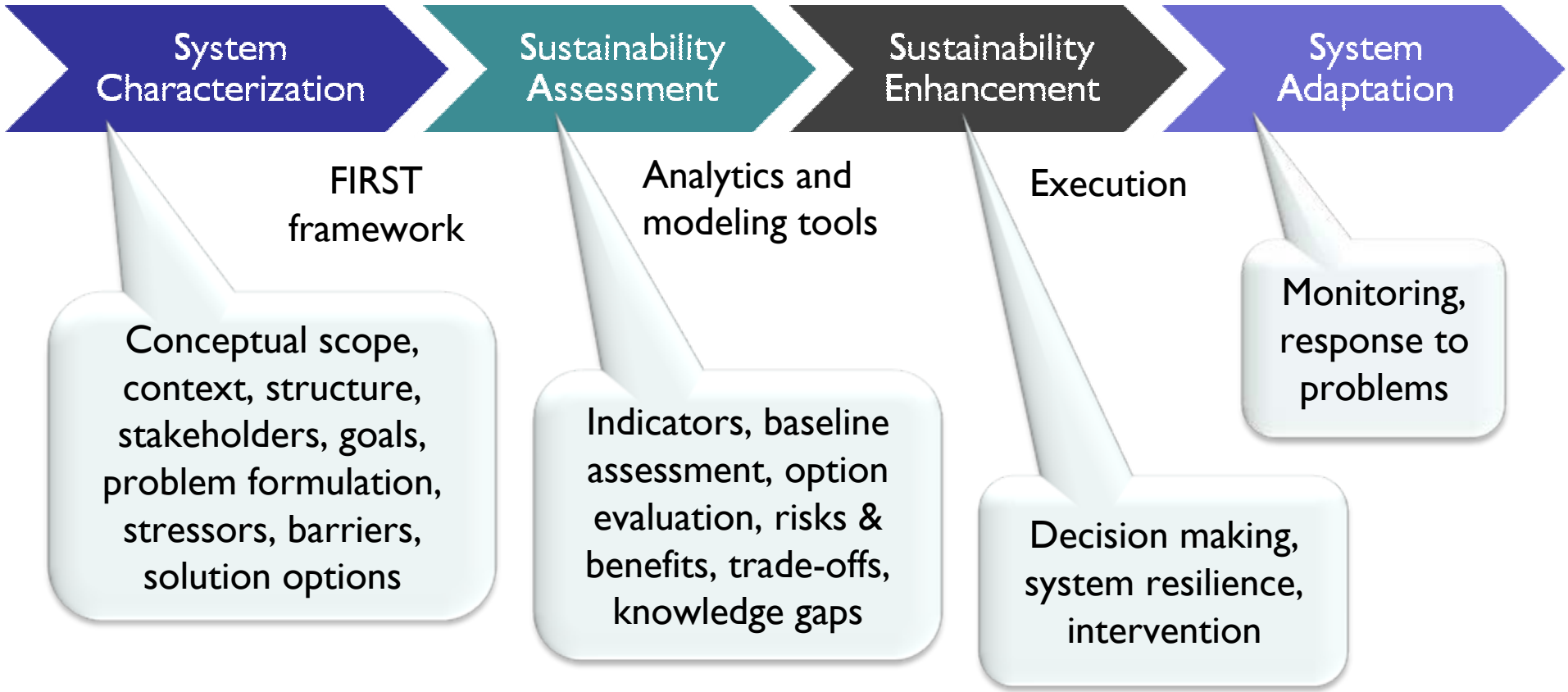
EPA
United States
Environmental Protection
Agency

ORD Program Thrusts (Linkages)



EPA United States Environmental Protection Agency

Realizing Sustainability



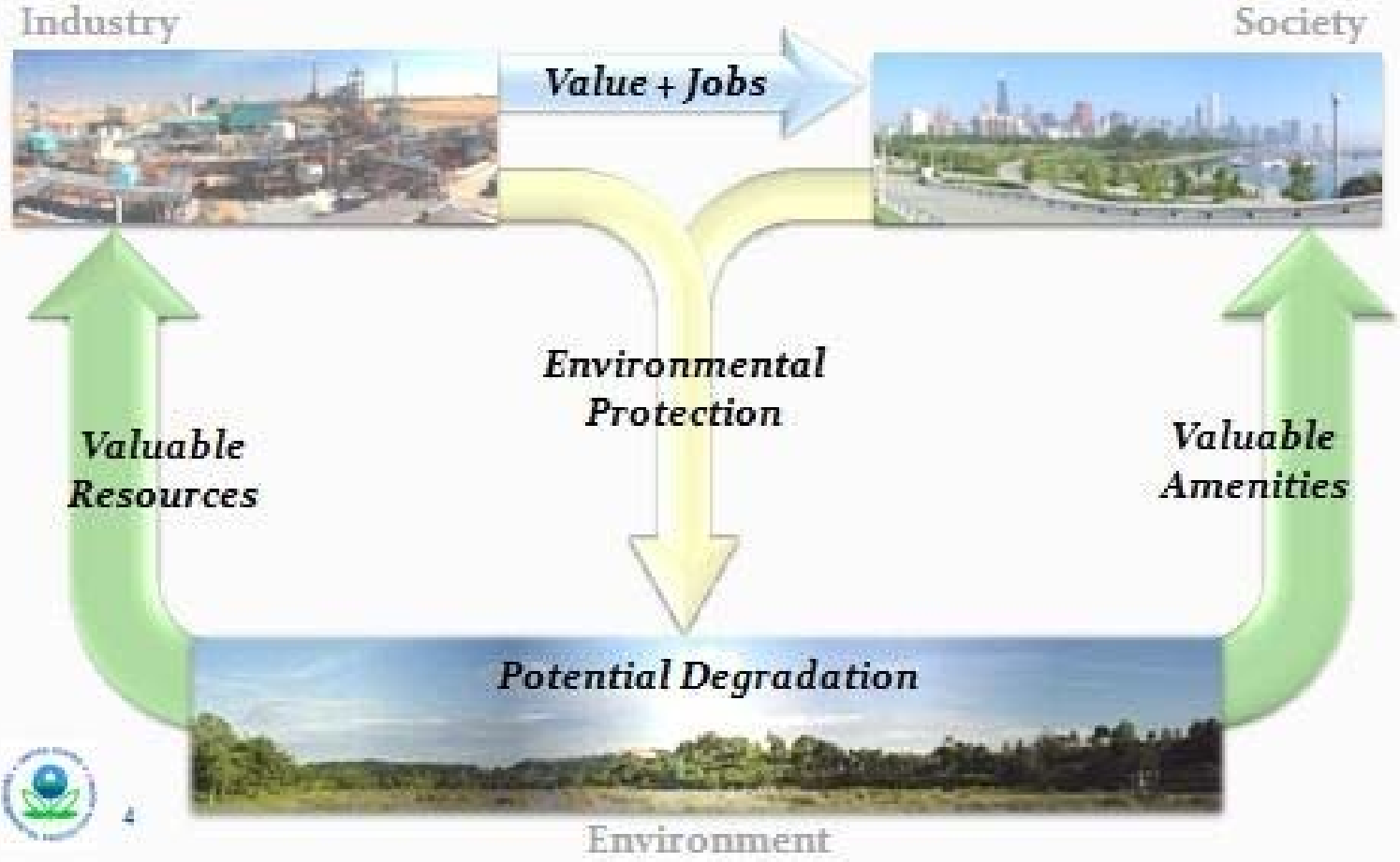
EPA
United States
Environmental Protection
Agency

FIRST: Framework for Integrated Research and Systems Thinking (work in progress)

- A unifying conceptual framework to support sustainability research at ORD
- A visual representation of the various domains of ORD investigation—air, water, land, health, energy, products, supply chains, communities, ecosystems—and how they are interrelated.
- A contribution to the sustainability science and technology community

EPA
United States
Environmental Protection
Agency

How Environmental Protection Supports Economic Growth and Human Well Being



EPA
United States
Environmental Protection
Agency

Ongoing Cross-Program EPA Work Groups (Defining EPA role and framework)

- Green Products (material use, LCA, metrics, labeling, reuse)
- Green Infrastructure (water management, energy-water-ecosystem interface
- Advancing Pollution Prevention (P2 to Sustainability)
- Sustainability Case Studies
- Managing Materials not waste (Sustainable Materials Management)
- Innovation and technology

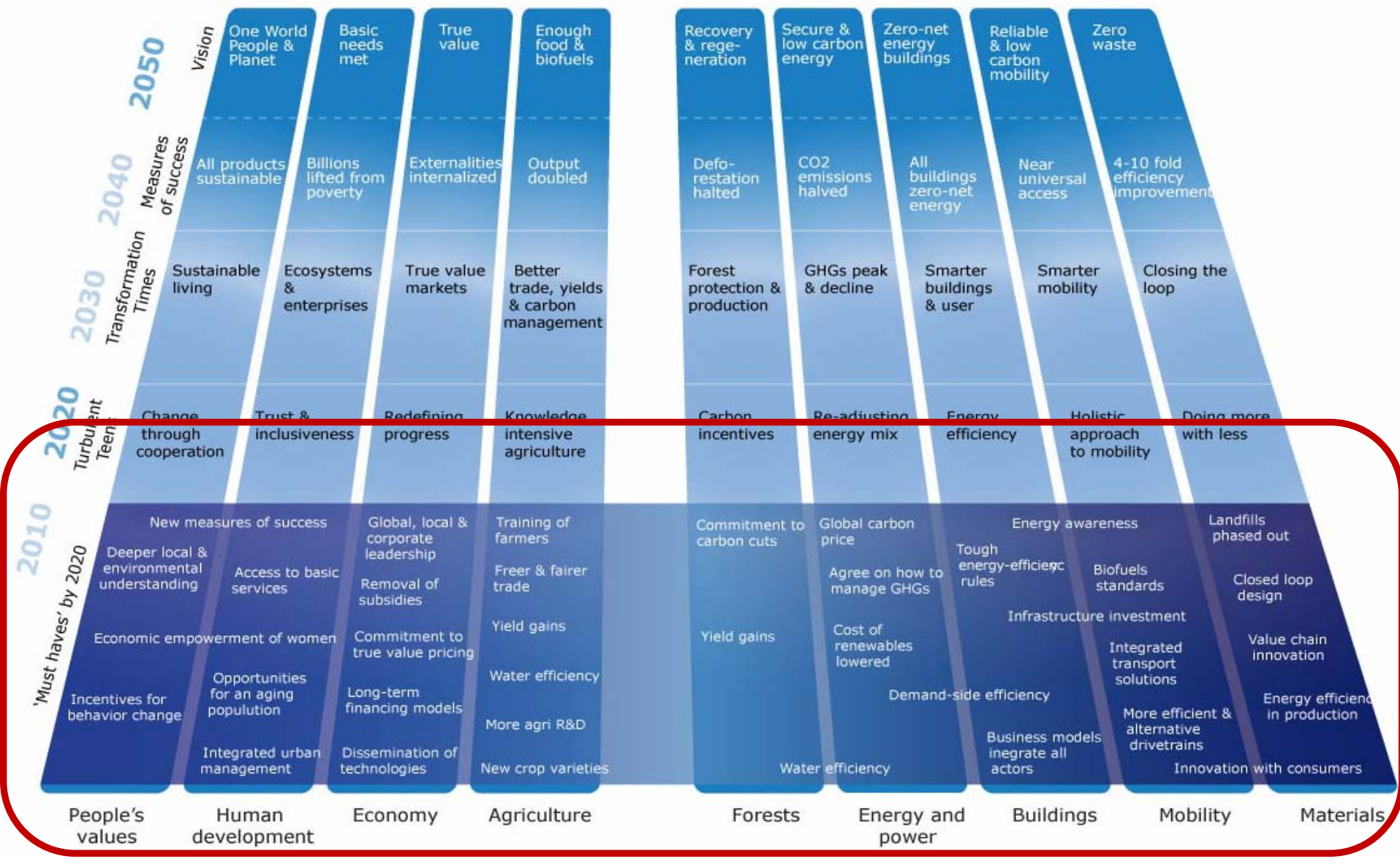
The Green Race is on

World Business Council for
Sustainable Development

EPA United States Environmental Protection Agency

Table 2: Emerging markets for biodiversity and ecosystems services		
Market opportunities	**Market size (US$ per annum)**	
	2008	**Estimated 2050**
Certified agricultural products	**$40 billion**	**$900 billion**
Certified forest products	**$5 billion**	**$50 billion**
Bio-carbon / forest offsets	**$21 million**	**$10+ billion**
Payments for water-related ecosystem services	**$5.2 billion**	**$20 billion**
Payments for watershed management	**$5 million**	**$10 billion**
Other payments for ecosystem services	**$3 billion**	**$15 billion**

Source: The Economics of Ecosystems & Biodiversity, TEEB for Business Executive Summary (2010)



Source: WBCSD Vision 2050

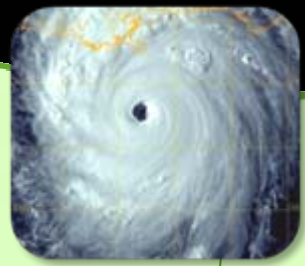
A Timeline of U.S. Environmental Progress

Yellowstone Park established 1872

Donora, PA fatal inversion 1948

Cuyahoga River, Cleveland fire 1969

Hurricane Katrina 2005



Gulf oil spill 2010

National Park Service est. 1916

"Silent Spring" published 1962

NEPA 1970

UN Earth Summit 1992

Kyoto Protocol adopted 1997

Copenhagen Climate Conference 2009

Millennium Ecosystem Assessment 2005

1900

1925

1950

1975

2000

2025

2050

19th CENTURY
focus on land conservation

20th CENTURY
focus on risks due to pollution

21ST CENTURY

- Life cycle thinking
- Global collaboration
- Market-based incentives
- Integrated inter-disciplinary solutions
- Investments in sustainable systems

OHIO STATE