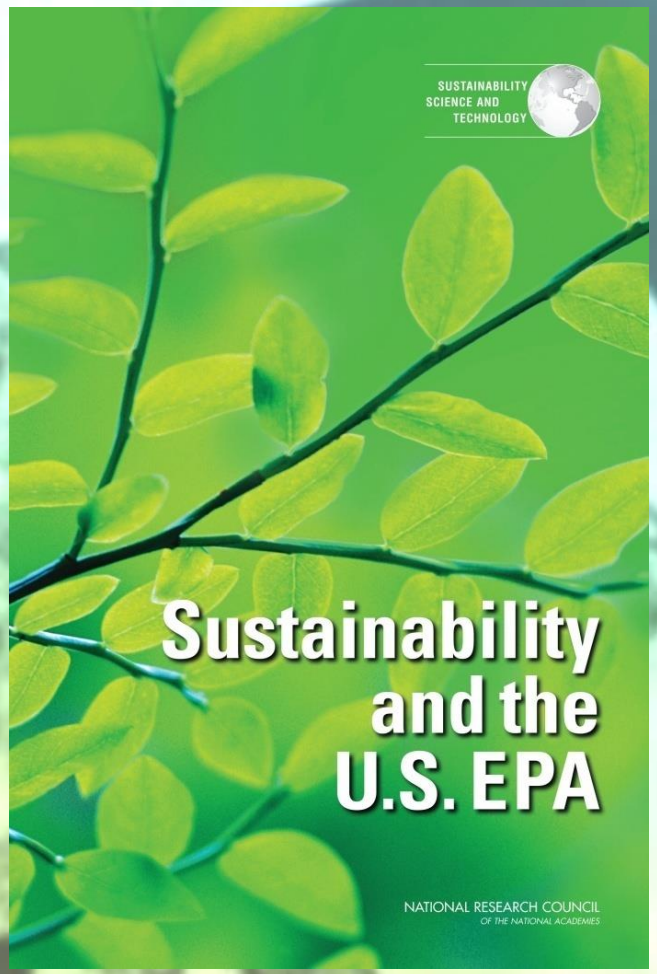
Science and Technology for Sustainability

Promoting Sustainability through NetZero Strategies

February 25, 2014

Science and Technology for Sustainability Program
Policy and Global Affairs Division
The National Academies

Sustainability and the U.S. EPA



Sustainability and the U.S. Environmental Protection Agency

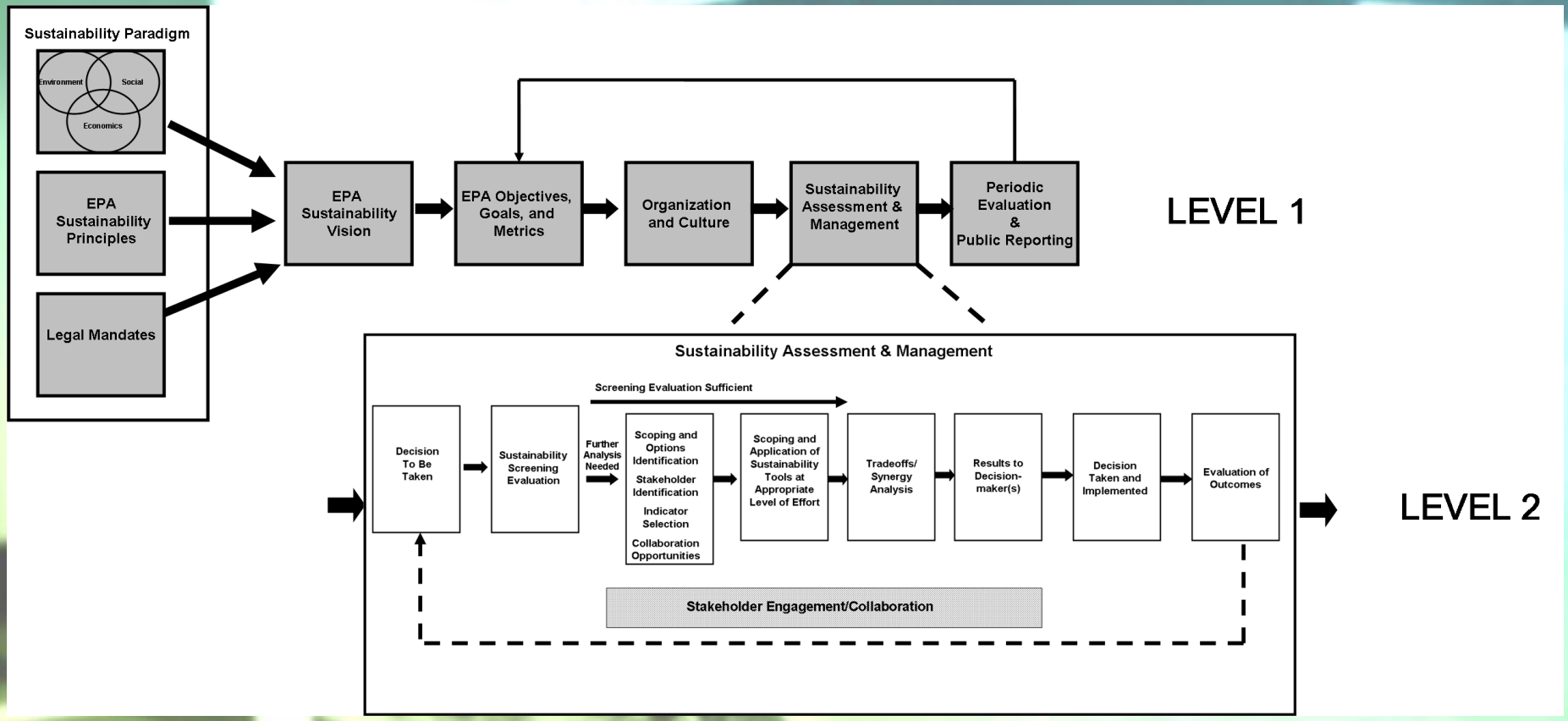
- Develop a framework for EPA to solve complex environmental challenges through a more integrated, systems approach
- Similar to the 1983 NRC report Risk Assessment in the Federal Government
- Defines for EPA a recommended framework that will then be scaled up under the broader NRC study, Sustainability Linkages in the Federal Government (“Linkages”) to develop a decision framework to help all federal agencies examine the consequences, tradeoffs, synergies, and operational benefits of sustainability-oriented programs

Sustainability and the U.S. Environmental Protection Agency

The consensus report answers the following questions:

- What should be the operational framework for sustainability for EPA?
- What scientific and analytical tools are needed to support the framework?
- How can the EPA decision making process rooted in the risk assessment/risk management (RA/RM) paradigm be integrated into this new sustainability framework?
- What expertise is needed to support the framework?

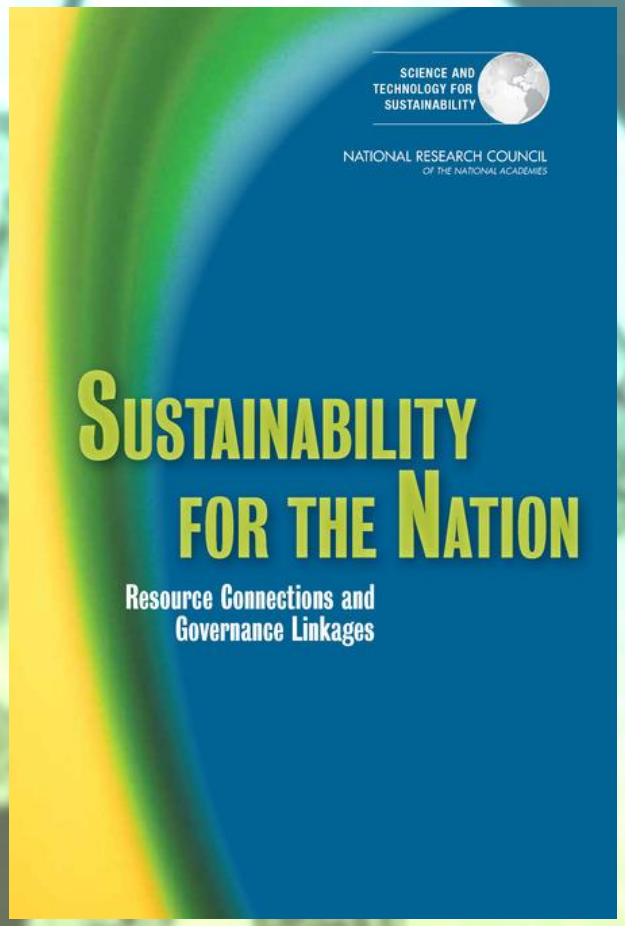
Sustainability Framework



Examples of Tools

- Risk Assessment
- Life-Cycle Analysis
- Benefit-Cost Analysis
- Ecosystem Services Valuation
- Integrated Assessment Models
- Sustainability Impact Assessment
- Environmental Justice Tools
- Present and Future Scenario Tools

Sustainability for the Nation: Resource Connections and Governance Linkages



Sustainability for the Nation: Resource Connections and Governance Linkages

Puget Sound Case Study

Issues

- Copper & Zinc runoff from brake linings
- Phosphorus runoff
- Native fishery survival

Results & Status

- Collaborative efforts->improved water quality
- Problems continue because of lack of precautionary zoning in key communities

Sustainability for the Nation: Resource Connections and Governance Linkages

Platte River Case Study

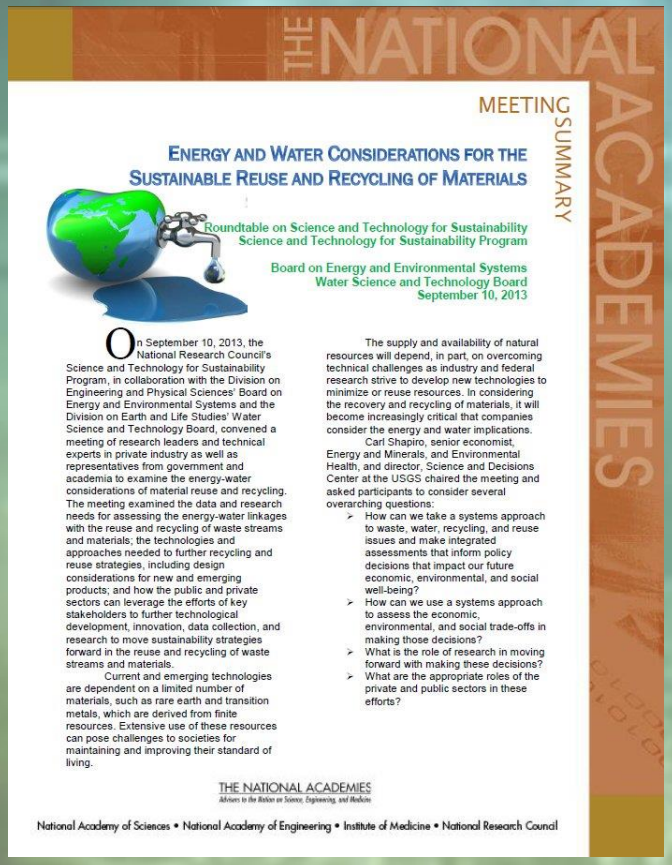
Results & Status

- Collaborative efforts->cooperation on water allocation and protection of endangered species habitat
- Platte River Program Governance Committee serves as a signal example of the benefits to be derived from regular stakeholder interaction and negotiation

Energy-Water Focus

Blue Plains

Energy-Water Focus



THE NATIONAL ACADEMIES

MEETING SUMMARY

ENERGY AND WATER CONSIDERATIONS FOR THE SUSTAINABLE REUSE AND RECYCLING OF MATERIALS

Roundtable on Science and Technology for Sustainability
Science and Technology for Sustainability Program

Board on Energy and Environmental Systems
Water Science and Technology Board
September 10, 2013

On September 10, 2013, the National Research Council's Science and Technology for Sustainability Program, in collaboration with the Division on Engineering and Physical Sciences' Board on Energy and Environmental Systems and the Division on Earth and Life Studies' Water Science and Technology Board, convened a meeting of research leaders and technical experts in private industry as well as representatives from government and academia to examine the energy-water considerations of material reuse and recycling. The meeting examined the data and research needs for assessing the energy-water linkages with the reuse and recycling of waste streams and materials; the technologies and approaches needed to further recycling and reuse strategies, including design considerations for new and emerging products; and how the public and private sectors can leverage the efforts of key stakeholders to further technological development, innovation, data collection, and research to move sustainability strategies forward in the reuse and recycling of waste streams and materials.

Current and emerging technologies are dependent on a limited number of materials, such as rare earth and transition metals, which are derived from finite resources. Extensive use of these resources can pose challenges to societies for maintaining and improving their standard of living.

The supply and availability of natural resources will depend, in part, on overcoming technical challenges as industry and federal research strive to develop new technologies to minimize or reuse resources. In considering the recovery and recycling of materials, it will become increasingly critical that companies consider the energy and water implications.

Carl Shapiro, senior economist, Energy and Minerals, and Environmental Health, and director, Science and Decisions Center at the USGS chaired the meeting and asked participants to consider several overarching questions:

- How can we take a systems approach to waste, water, recycling, and reuse issues and make integrated assessments that inform policy decisions that impact our future economic, environmental, and social well-being?
- How can we use a systems approach to assess the economic, environmental, and social trade-offs in making those decisions?
- What is the role of research in moving forward with making these decisions?
- What are the appropriate roles of the private and public sectors in these efforts?

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences • National Academy of Engineering • Institute of Medicine • National Research Council

Energy-Water Considerations for the Sustainable Reuse and Recycling of Materials (September 10, 2013)

Overarching Themes

- Closing energy, water, and waste loops in industrial facilities can be challenging.
- Cost of water needs to be addressed in order to better price trade-offs between domains.
- There is tremendous potential for research on energy, water, and waste linkages that could benefit from public-private partnerships.

Fostering Partnerships and Linkages in Sustainability Science and Innovation – A Symposium

- Symposium held May 2012
- Goals
  - Showcase federal investments and institutional structures regarding sustainability
  - Identify opportunities to help promote practices that would lead communities toward sustainability
  - Address communication issues needed to recognize science and innovation as central to the understanding and adoption of sustainable practices
- Summary issued November 2012
- Follow up meeting on development of agriculture portfolio to be held April 2013

Considerations for the Future of Animal Science Research

Source: Shutterstock

Considerations for the Future of Animal Science Research

Statement of Task

•Identify critical research and development (R&D), technologies, and resource needs for research in the field of animal agriculture, both nationally and internationally.

•Identify the most important needs for future research, including:

- Assessing global demand for products of food animal origin in 2050 within the framework of ensuring global food security;
- Evaluating how climate change and limited natural resources may impact the ability to meet future global demand for animal products in sustainable production systems;
- Identifying the needs for human capital development, technology transfer and information systems for emerging and evolving animal production systems in developing countries
- Assessing R&D needs in animal agriculture in Sub-Saharan Africa and South Asia, with a focus on priority livestock in those regions

Pathways to Urban Sustainability

Perspectives from Portland and the Pacific Northwest

Issues

- Factors contributing to Portland's success include strong public-private partnerships, a culture of planning, and a willingness to implement diverse ideas generated by public, private, and academic sectors
- However, some challenges remain in achieving social equity and providing opportunities for job growth
  - Traditionally high unemployment rates
  - High Income Taxes
  - High Poverty Rates

Questions?

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