

# Basic Principles and Decision Criteria for Incorporating Sustainability in USEPA Programs

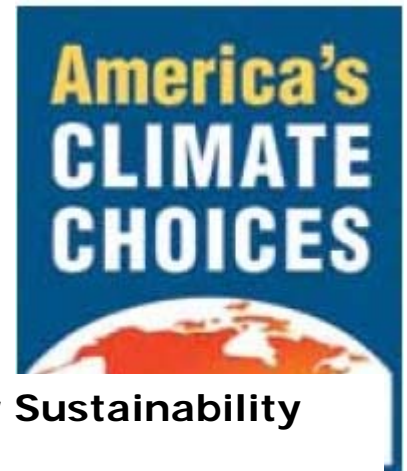
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Professor of Environmental Engineering and Co-Principal Investigator, the  
Consortium for Risk Evaluation with Stakeholder Participation

A presentation to the First Committee Meeting of  
**an ad hoc committee under the Science and Technology for Sustainability  
Program (STS) charged with**

Incorporating Sustainability in the U. S. Environmental Protection Agency  
National Academy of Sciences    Washington, DC

December 14, 2010



U.S. Environmental Protection Agency

## Strategic Sustainability Performance Plan

FY 2010–FY 2020

June 2, 2010



## Science and Technology for Sustainability (STS) Program

[The National Academies'](#) Science and Technology for Sustainability Program (STS) in the division of [Policy and Global Affairs](#) was established to encourage the use of science and technology to achieve long term sustainable development. The goal of the STS program is to contribute to sustainable improvements in human well-being by creating and strengthening the strategic connections between scientific research, technological development, and decision-making. The program concentrates on activities with the following attributes:

- Cross-cutting in nature, requiring expertise from multiple disciplines;
- Important both in the United States and internationally;
- Effectively addressed via cooperation among multiple sectors, including academia, government, industry, and non-governmental organizations (NGOs).

***“Sustainability” is ubiquitous on the websites of federal agencies and the Academies***



Sustainable Jersey strives for a better tomorrow one community at a time.  
The program encompasses the three equal, interrelated components of sustainability:

- Prosperity** – support your local economy and use community resources
- Planet** – practice responsible environmental management and
- People** – embrace social equity and fairness

The program is a consensus oriented, science-based approach that aligns the interests and resources of actors in a community for the common purpose of achieving sustainability.

#### SUSTAINABLE JERSEY

that want to go green  
Sustainable Jersey:

- Identifies concrete actions
- and be considered leading
- Provides clear “how to”
- Provides access to grants
- for municipalities to make
- Encompasses the 3 equal, interrelated components of sustainability: Prosperity-support your local economy; Planet-practice responsible environmental management; and People-embrace social equity and fairness

New Jersey is the first state in the nation to create a comprehensive sustainability program for communities that links certification to a state and private financial incentives, and a fully resourced program of technical support and training.

**Teaneck Township Council Resolution on Sustainability – August 2010**

Whereas, the Township of Teaneck has registered with Sustainable Jersey and seeks to make Teaneck a model community for sustainability in its municipal operations and through promoting environmental sustainability among its residents; and....

Whereas, the Sustainable Jersey program requires that this committee be broadly representative of the entire community, and the current committee structure does not meet the requirements;

Now Therefore, The Council establishes as a permanent Advisory Board the Teaneck Advisory Commission on Sustainability whose mission shall be to advise the Town Council on ways to improve municipal operations with initiatives that are economically and environmentally sound, to recommend and promote best practices that can be adopted by businesses and residents within the township, work with the Town Manager to apply for, secure and administer grants that support sustainability, and take other steps as it deems necessary or desirable in its advisory capacity to promote sustainability in Teaneck.

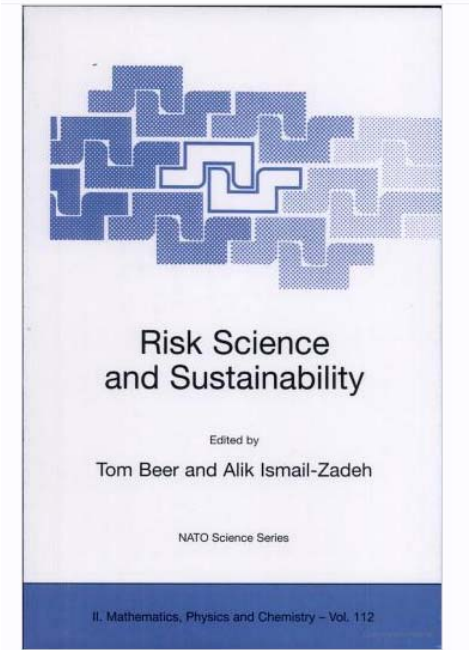
*It is happening all over  
the Nation at every level*

# ENVIRONMENTAL INDICATORS: A Systematic Approach to Measuring and Reporting on Environmental Policy Performance in the Context of Sustainable Development



WORLD RESOURCES INSTITUTE

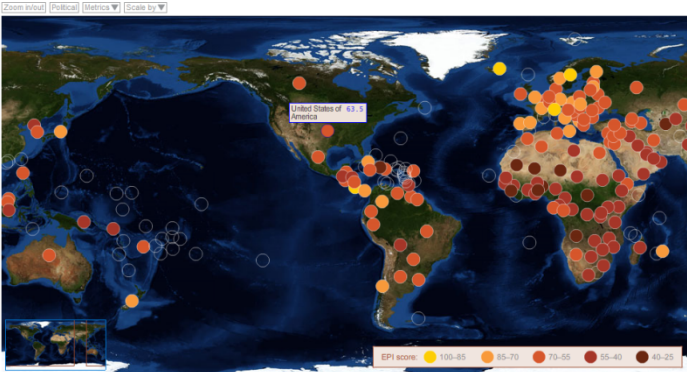
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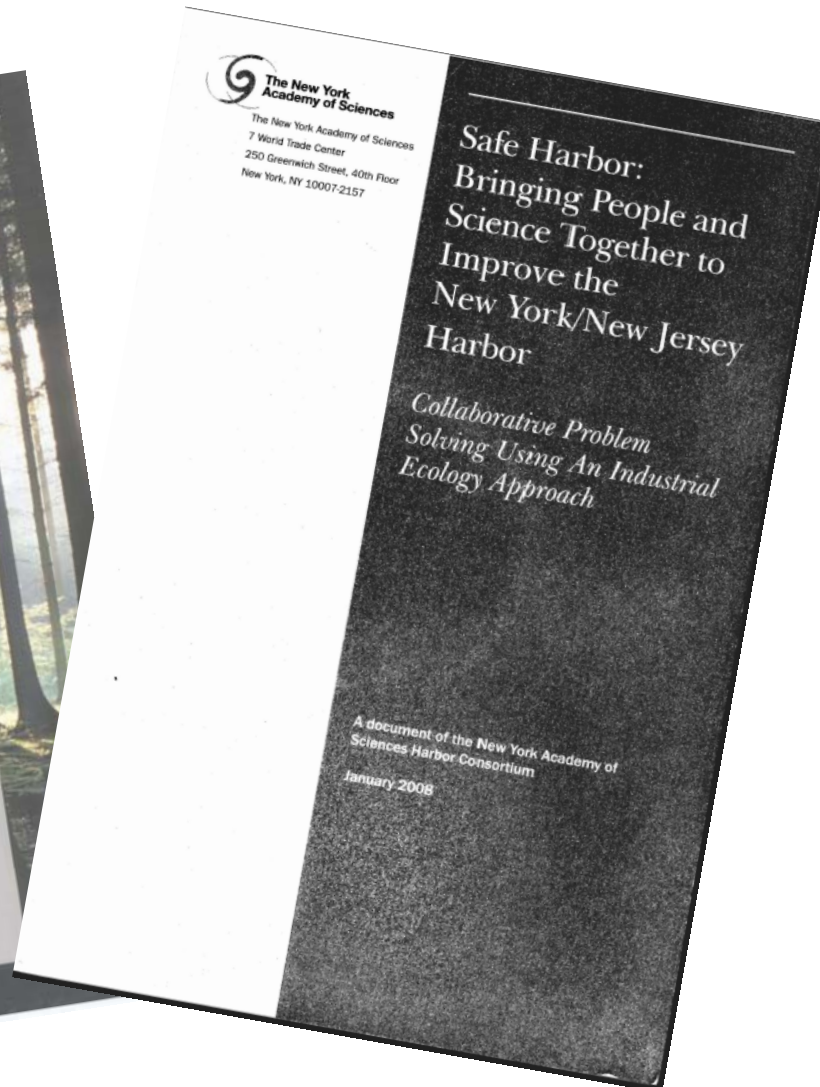
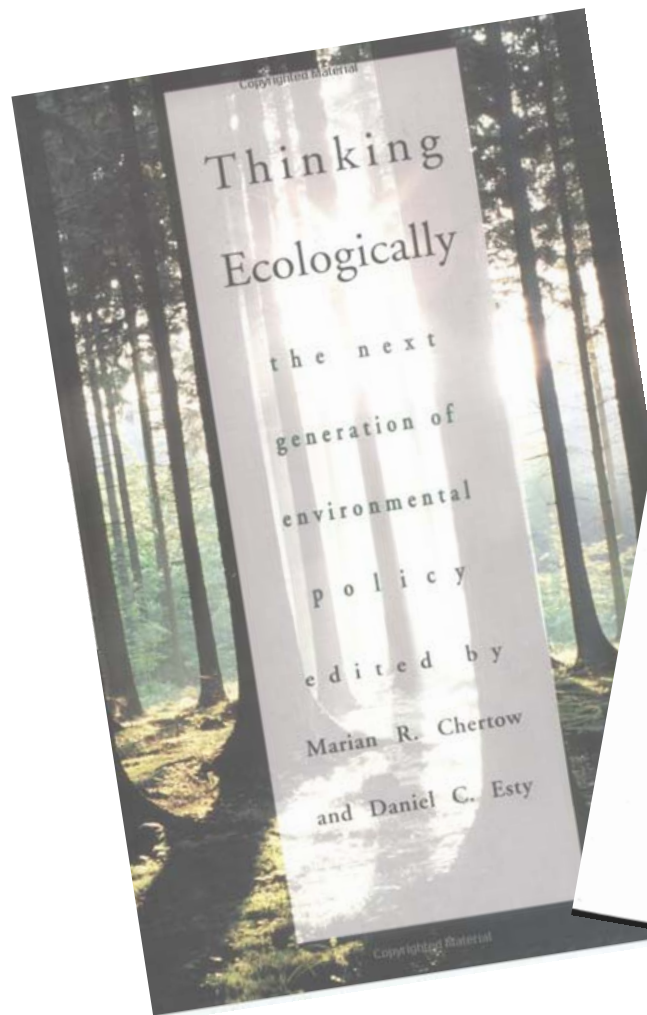
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## ENVIRONMENTAL PERFORMANCE INDEX 2010

The 2010 Environmental Performance Index (EPI) ranks 163 countries on 25 performance indicators tracked across ten policy categories covering both environmental public health and ecosystem vitality. These indicators provide a gauge of a nation's government scale of how close countries are to established environmental policy goals.







In fact, I have made my own forays into these issues both writing and doing

***But as EPA Leadership has recognized, Sustainability's omnipresence can create cacophony and complicate the task of codifying it and making it operational. Hence:***

## THE AGENCY'S CHARGE TO THE COMMITTEE:

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

The Agency for which you are being asked to develop a new approach that incorporates sustainability into its foundations is still largely organized as it was in the 70's. Should that be reexamined?

## EPA Organizational Structure

### Office of the Administrator

202-564-4700

[About OA](#)

### Headquarters offices:

#### Office of Administration and Resources Management

202-564-4600

[About OARM](#)

#### Office of Air and Radiation

202-564-7404

[About OAR](#)

#### Office of Chemical Safety and Pollution Prevention

202-564-2902

[About OCSPP](#)

#### Office of the Chief Financial Officer

202-564-1151

[About OCFO](#)

#### Office of Enforcement and Compliance Assurance

202-564-2440

[About OECA](#)

#### Office of Environmental Information

202-564-6665

[About OEI](#)

#### Office of General Counsel

202-564-8040

[About OGC](#)

#### Office of Inspector General

202-566-0847

[About OIG](#)

#### Office of International and Tribal Affairs

202-564-6600

[About OITA](#)

#### Office Research and Development

202-564-6620

[About ORD](#)

#### Office of Solid Waste and Emergency Response

202-566-0200

[About OSWER](#)

#### Office of Water

202-564-5700

[About OW](#)

### Regional offices around the nation:

**“It is the beginning of a new approach. It is a step toward the more effective pursuit of all of our work, including our statutory requirements, by incorporating sustainability into our foundations.” Administrator Jackson**

***Sustainability the Noun describes a state of affairs we seek but patently have not achieved***

**SUSTAINABILITY is “Meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.” EPA - Anastas**

***Sustainable \_\_\_\_\_ - the Adjective is a modifier of some one of many types of human activity that has as a goal a state of affairs that can endure***

**“Sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.” Bruntland Commission**



*So, in my assignment some consideration of Definitions, Principles, Decision Criteria, Organizational Arrangements - but not always in that order:*

## **THE CORE OBJECTIVES OF SUSTAINABILITY\***

- To enhance individual and community health, well-being and welfare by following a path of economic development that safeguards the welfare of future generations
- To provide for equity within and between generations
- To protect biological diversity and maintain essential ecological processes and life-support systems

The definitional issue: does the Bruntland Commission definition, attractive because of its simplicity, really capture all that is needed if these **are** the core objectives

\*Largely taken from Environment Australia

*Additionally, we note that in Assistant Administrator Anastas' presentation he indicates that EPA identifies four specific elements apparently as intrinsic to the Sustainability framework it seeks.*

**Sustainability is to:**

- 1. Achieve environmental protection, economic growth, and societal health synergistically**
- 2. Incorporate environmental justice into all of our work**
- 3. Ensure the protection of disproportionately impacted communities and vulnerable populations**
- 4. Design our efforts to protect human health and the environment in a way that prevents unintended consequences**

***Acknowledging the conciseness and simplicity, do either of the Bruntland-derived definitions actually incorporate the complexity of human and environmental systems, the social and economic dynamics and/or scientific challenges involved in actually identifying sustainable policies and activities?***

***Put differently: Do the core objectives identified above need Sustainability to have a more robust definition that better directs attention to the dilemmas of selecting appropriate scale, timeframes and context?***

**If so, there are many other concise options – such as**

“Sustainability is improving the quality of human life while living within the carrying capacity of supporting ecosystems”

IUCN/UNEP/WWF

“Sustainable development is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.”

Environment Australia

NEPA – but with the recognition of its limited scope of applicability

***Some answers to these questions – and their implications for decision criteria - may be aided by identifying some guiding principles of Sustainability. Australia's list is illustrative.***

### ***Can we now identify key Guiding Principles of Sustainability***

- Decision making processes should effectively integrate both long- and short-term economic, environmental, social and equity considerations;
- Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- The global dimensions of environmental impacts of actions and policies should be recognized and considered;
- The need to develop a strong, growing, and diversified economy which can enhance the capacity for environmental protection should be recognized;
- The need to maintain and enhance international competitiveness in environmentally sound manner should be recognized;
- Cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing, and incentive mechanisms; and
- Decisions and actions should provide for broad local community involvement on issues which affect them.

**Environment Australia**

*With this groundwork, let’s explore again the organizational characteristics of the Agency – at inception and largely the same today – as compared to organizational concepts described in the Ash Commission report that was responsible for the Agency’s creation:*

## EPA Organizational Structure




### Regional offices around the nation:

When EPA was organized that way, it was inconsistent with the original Ash Commission charge. This stove-piped organization may have been required by the evolution of the laws EPA was charged with administering; but it was surely not responsive to the first new law under its jurisdiction, the holistic NEPA



# What did the Ash Commission actually recommend?



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### Ash Council Memo

EXECUTIVE OFFICE OF THE PRESIDENT  
PRESIDENT'S ADVISORY COUNCIL ON EXECUTIVE ORGANIZATION  
WASHINGTON, D.C. 20506

**April 29, 1970**

**MEMORANDUM FOR THE PRESIDENT**

**SUBJECT: Federal Organization for Environmental Protection**

“Our National Government is neither structured nor oriented to sustain a well-articulated attack on the practices which debase the air we breathe, the water we drink and the land that grows our food. Indeed, the present departmental structure for dealing with environmental protection defies effective and concerted action. The environment, despite its infinite complexity, must be perceived as a unified, interrelated system. Present assignments of departmental responsibilities do not reflect this primary characteristic.

Many agency missions, for example, are designed primarily along media lines--air, water, and land. Yet the sources of air, water, and land pollution are interrelated and often interchangeable. “

## **And more of Ash Commission recommendations on EPA Organizational Structure**

“The functions assigned to the EPA are not the only determinants of its effectiveness. Performance will be helped or hindered by the way the programs and functions which make up the EPA are structured within the new organization. We have rejected, for example, trying to achieve the EPA's objectives by organizing around: Media, i.e., air, water, land... [which fails to deal with the fact that forms of pollution tend to be interrelated and interchangeable], or Sources of pollution,... or Effects of pollution on national goals,... [which misses the need to treat the environment in terms of its interdependent relationships]... or Location of Pollution, i.e., in cities, rural areas, ocean and coastal zones...[which would diffuse the attack on the problem and create both administrative and geographic fragmentation].

In our opinion, the EPA should be designed around its major functions--monitoring, research, standard-setting, enforcement and assistance. This organizational structure would:

- Recognize the interrelated nature of pollution problems;
- Address the fact that pollutants cut across media lines;
- Encourage balanced budget and priority decisions between component functions; and
- Permit more effective evaluations of total program performance”

**What can be done, through a Sustainability framework, to begin to recover these organizational premises advocated for what we see as parallel reasons?**

## **Some general criteria to guide sustainability-promoting activity**

### *Decision Criterion I: Scope*

Any approach identified by the subcommittee must be specific to EPA mission and functions, continually acknowledge the fact that it is beginning an evolutionary process that will be iterative and continually need further specification and updating – and that the Agency will likely have to acknowledge mistakes made in forecasting what Sustainability requires and in applying its Sustainability-focused decisions

### *Decision Criterion II Anticipating the right timing to shift activity to prevention:*

Before the need for interdiction arises, sustainability considerations and factors - defined to apply to issues over which the Agency has authority - should be brought to bear on every Agency function, including the writing of regulations, decisions about compliance and enforcement policy and the development of guidance for every EPA program area.

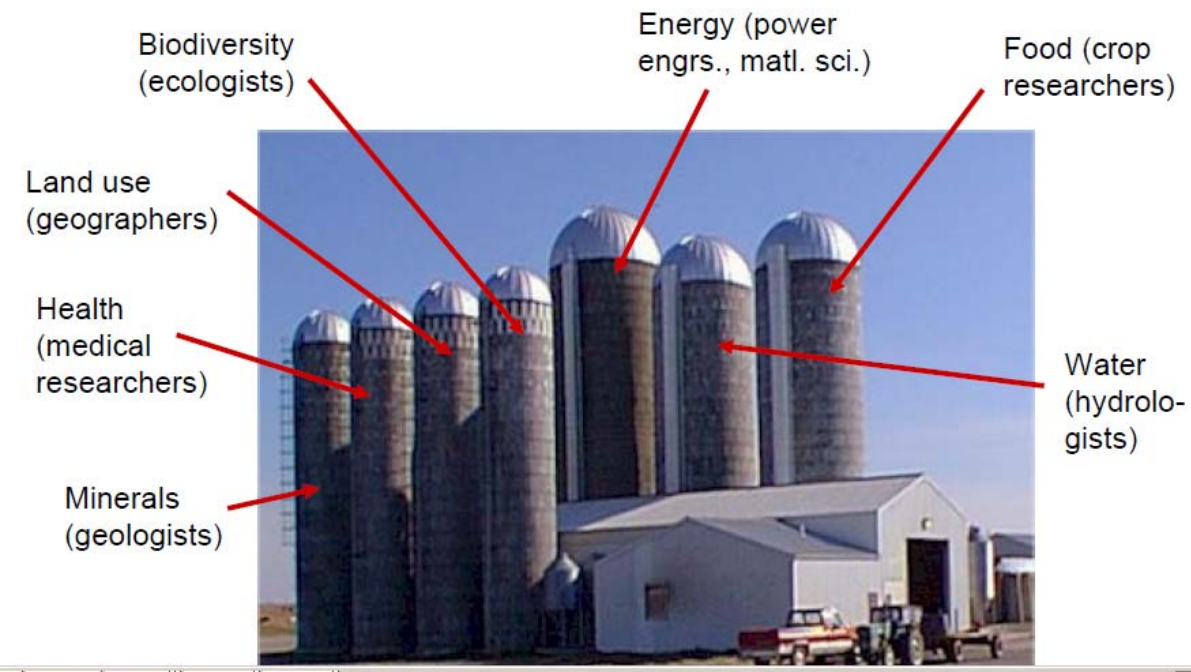
### *Decision Criterion III To make the Sustainability framework earning a two-way street*

EPA should have a formal feedback mechanism into its own operations to actually capture the implications for itself of Sustainability work it funds others to do – and a formal review of project results for this explicit purpose should be a responsibility of the Office of Sustainability (see below)

## *Decision Criterion IV: Who at EPA and how to make the Sustainability framework part of the job*

Decision criterion IV a: What employee disciplines should be part of Sustainability decisions

### The Sustainability Silos of the Experts



Slide from Tom Graedel, Linkages of Sustainability, Roundtable, October 28, 2010

The Agency framework under which sustainability analyses or components thereof are conducted should routinely – as a “best practice” - include the input of not only the relevant “hard science” disciplines whose expertise addresses the issues involved but also both “decision Scientists” (broadly understood) and the input of affected parties (affected both by the direct environmental insult being addressed but also those likely to be affected by the risk treatments or other interdictions being considered).

*Decision Criterion 4b: Evolving Sustainability principles for the many disciplines the Agency Employs*  
*That is, should there be a equivalent to the 12 Principles of Green Chemistry for all EPA disciplines?*

## **The Green Chemistry example:**

### **Twelve Principles of Green Chemistry \***

#### **Prevention**

It is better to prevent waste than to treat or clean up waste after it has been created.

#### **Atom Economy**

Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.

#### **Less Hazardous Chemical Syntheses**

Wherever practicable, synthetic methods should be designed to use and generate substances that possess little or no toxicity to human health and the environment.

#### **Designing Safer Chemicals**

Chemical products should be designed to effect their desired function while minimizing their toxicity.

#### **Safer Solvents and Auxiliaries**

The use of auxiliary substances (e.g., solvents, separation agents, etc.) should be made unnecessary wherever possible and innocuous when used.

#### **Design for Energy Efficiency**

Energy requirements of chemical processes should be recognized for their environmental and economic impacts and should be minimized. If possible, synthetic methods should be conducted at ambient temperature and pressure.

#### **Use of Renewable Feedstocks**

A raw material or feedstock should be renewable rather than depleting whenever technically and economically practicable.

#### **Reduce Derivatives**

Unnecessary derivatization (use of blocking groups, protection/deprotection, temporary modification of physical/chemical processes) should be minimized or avoided if possible, because such steps require additional reagents and can generate waste.

#### **Catalysis**

Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.

#### **Design for Degradation**

Chemical products should be designed so that at the end of their function they break down into innocuous degradation products and do not persist in the environment.

#### **Real-time analysis for Pollution Prevention**

Analytical methodologies need to be further developed to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances.

#### **Inherently Safer Chemistry for Accident Prevention**

Substances and the form of a substance used in a chemical process should be chosen to minimize the potential for chemical accidents, including releases, explosions, and fires.



*Decision Criterion IVc: Making Sustainability concepts every employee's business*

Concepts which implement sustainability (prevention, industrial ecology, long-term effectiveness, conservation of resources) should be written into the job descriptions and performance objectives of every EPA employee – tied specifically to their current jobs – and incentives provided for / awards given to employees who propose and develop ways to implement such concepts as they are applied in their sphere of responsibility. Annual reviews of the opportunities afforded to pursue such concepts, evaluation of their effectiveness, synthesis of successful sustainability initiatives and articulation of them as best practices should occur annually. Additionally, opportunities to “roll up” best sustainability practices and explore their application in additional EPA program areas should formally occur annually.

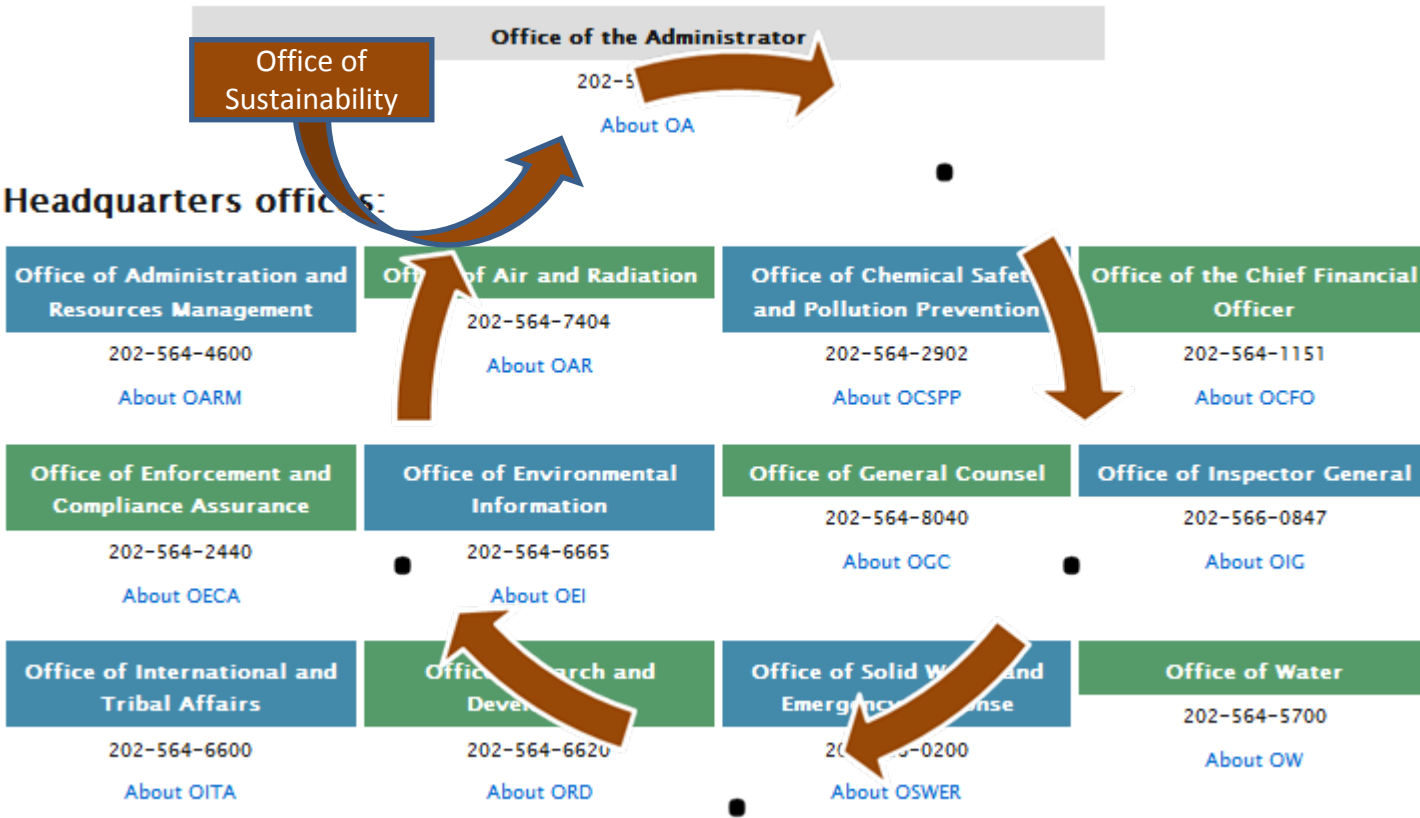
*Decision Criterion V : Giving Organizational Impetus and Protection  
to EPA's evolving Sustainability framework*

To implement the other decision criteria, the Agency should flag every major complex task it is given to determine whether the issue provides the Agency with an opportunity to implement its iterative, systems-oriented, longer-term Sustainability framework. And for this purpose it should establish for the purpose of implementing the Sustainability framework a new and senior organizational capacity, the Office of Sustainability. It should be resourced from ORD, but also from the GC's office, the policy office and each of the major program offices. OS should literally serve as **the primary portal through which** all non-routine issues coming to the Agency (from Congress, to significant compliance challenges, to treaties of all sorts and state and local requests, and NGO suggestions). It should serve also as **a primary receptacle** for issues raised from within the Agency (HQ and the regions). In every case, the purpose will be to determine whether integrative sustainability factors not previously considered in analogous situations can now utilize the Sustainability framework as it is addressed within the home program office – and with resources to track these applications in subsequent management within the Agency. This OS entity would, except where, for compelling reasons of classified information, be transparent and conduct its deliberations open to public input.

Criterion V in diagrammatic form

An organizational way to enhance and protect the new fabric of Sustainability at EPA

## EPA Organizational Structure

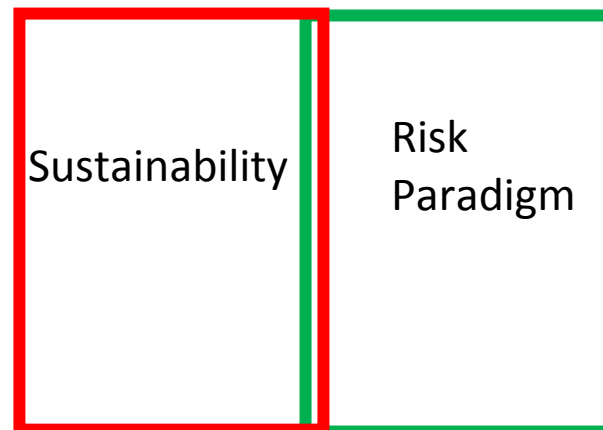
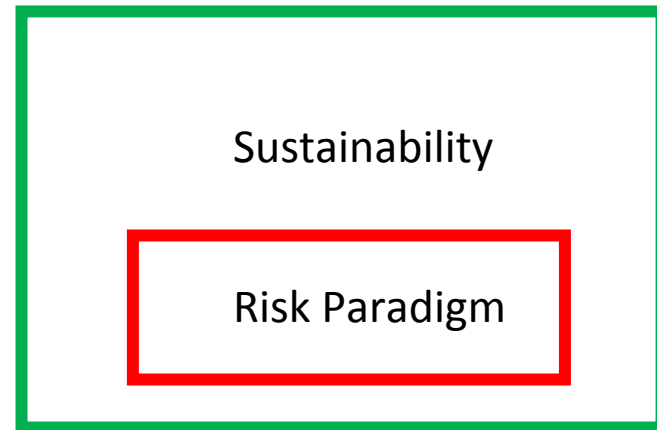
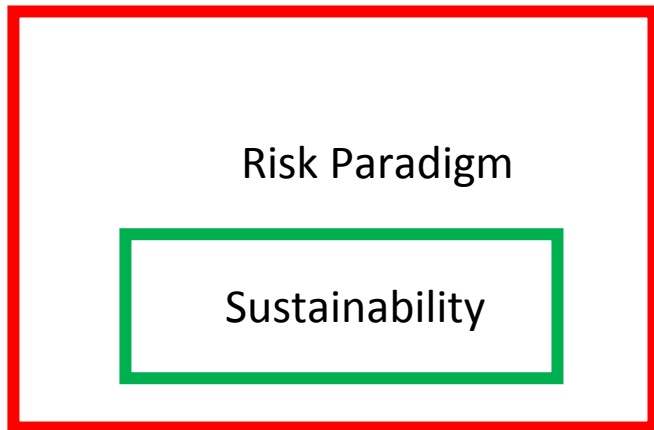


Regional offices around the nation:

Finding an evolutionary way to incorporate sustainability framework factors throughout an EPA whose programmatic action that is largely “stovepiped” in media-based offices

*Turning now to another key part of the new NAS charge:*

**How can the EPA decision making process rooted in the risk assessment/risk management (RA/RM) paradigm be integrated into this new sustainability framework?**

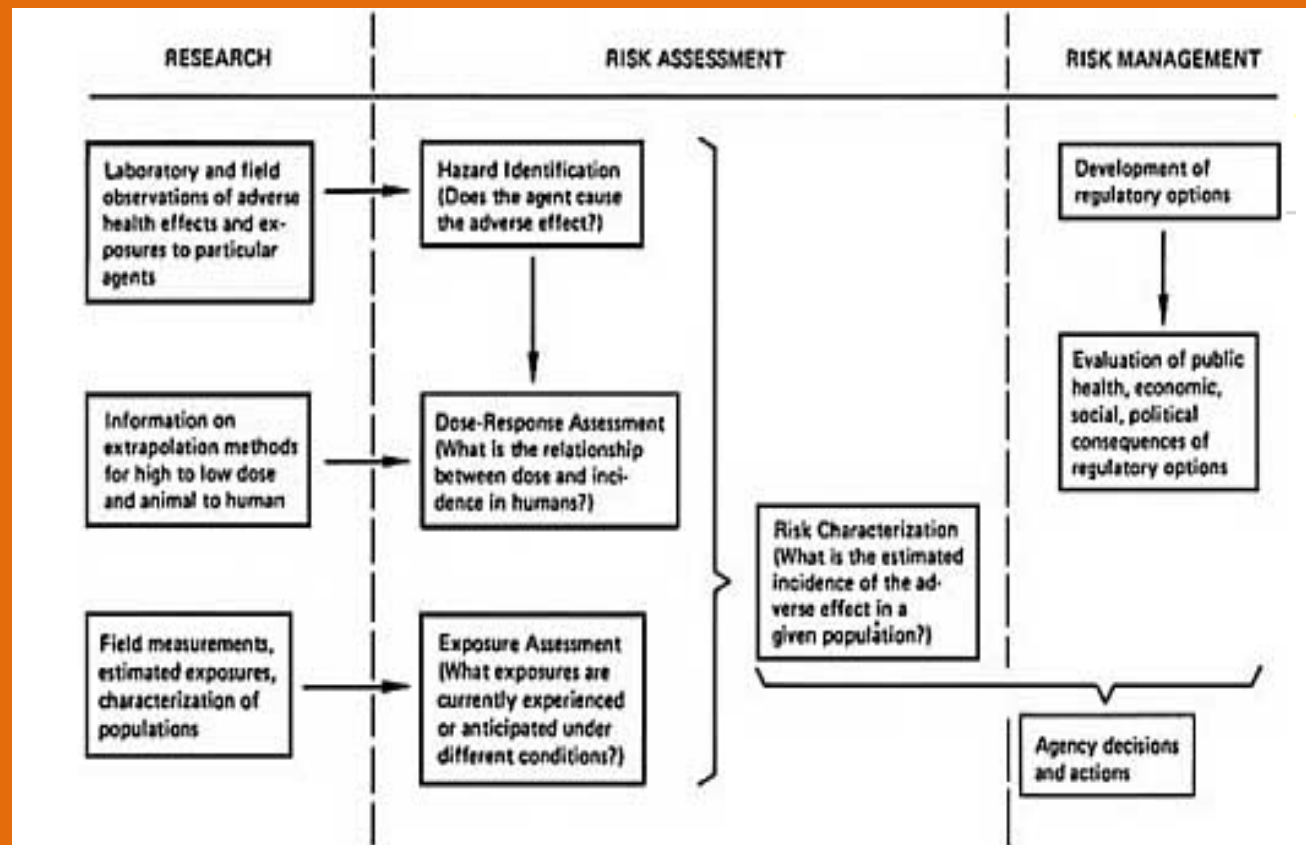


# Sustainability systems factors to augment risk assessment and risk management

Sustainability Research



Life-cycle analysis  
Mass balance analysis  
IE track down/synthesis



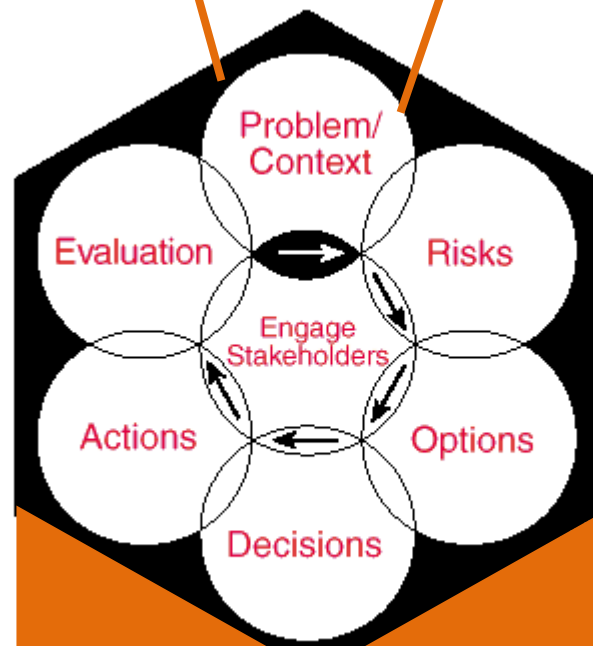
Sustainability  
Alternatives  
Analysis

FIGURE 3-1 Elements of risk assessment and risk management.

Anticipatory, prevention alternatives



# Sustainability Analysis Setting the Context of Agency Action



PCCRARM  
Risk Paradigm

Sustainability evaluation of options, decisions and action

*Consideration of the risk paradigm should lead to yet another decision criterion:*

*Decision Criterion VI: Considering what to do when risk management and sustainability factors do not cohere.*

Any sustainability approach or analysis which is inconsistent with the results of traditional risk assessment/risk management evaluation or with the routine application of standards requiring specific risk treatment should never result in regulatory provisions, compliance approaches or technology selections that result in less protectiveness than would have the “traditional” approach unless in a senior level review, more comparable health and environmental benefits are found to be predictably achieved using the Sustainability framework/principles than would have been achieved with the traditional approaches.

## A start toward finding the Basic Elements of a Green Book

<b>Current / Future Human Generations</b>	<b>Algorithm to define equity and its application</b>
<b>Resource Use and Substitution</b>	Definition of what resource stocks and prospects imply for limiting use of finite resources and investment to achieve sustainable substitution
<b>Renewable/Nonrenewable Environmental Degradation</b>	Treatment of uncertainty and comparative long-term significance of environmental damage and its implications for Agency action and inaction