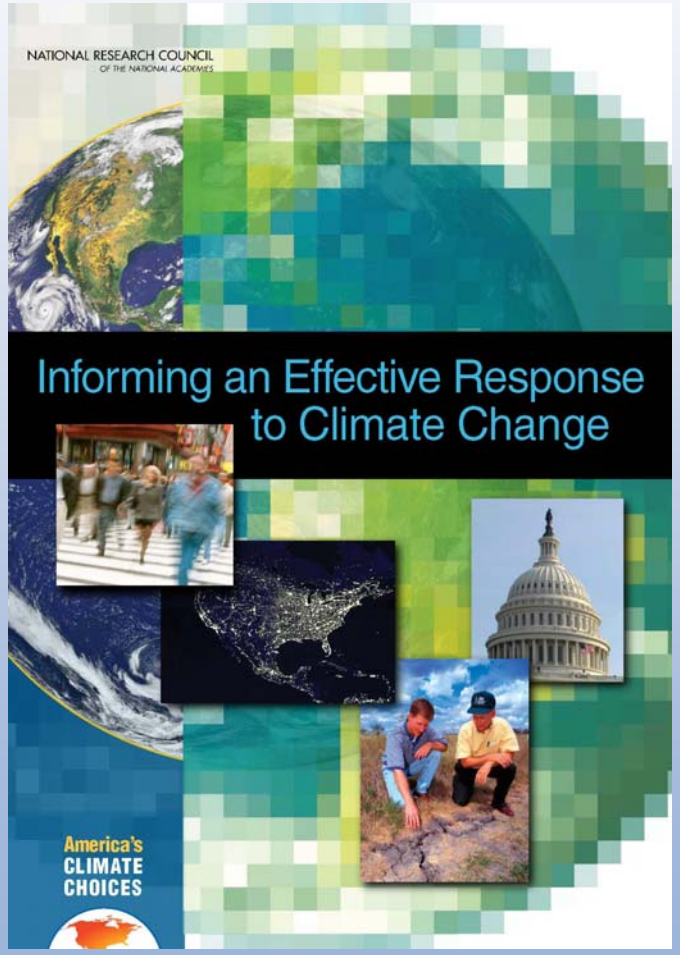
America's
CLIMATE CHOICES
AT THE NATIONAL ACADEMIES



Informing an Effective Response to Climate Change

Diana Liverman, University of Arizona

Peter Raven, Missouri Botanical Gardens

Co-Chairs

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http://americasclimatechoices.org

Request from Congress

The Department of Commerce Appropriations Act of 2008 (Public Law 110-161) calls for the National Oceanic and Atmospheric Administration (NOAA) to execute an agreement with the National Academy of Sciences to:

"…investigate and study the serious and sweeping issues relating to global climate change and make recommendations regarding what steps must be taken and what strategies must be adopted in response to global climate change, including the science and technology challenges thereof."

Four Panel reports address what can be done to:

- **limit the magnitude of climate change**
- **adapt to the impacts of climate change**
- **advance the science of climate change**
- ***inform effective decisions about climate change***

A *final report* (of a committee composed of the panel Chairs and vice-Chairs, plus others) will offer advice on response strategies that look across the realms of limiting, adapting, advancing science, and informing effective decisions.

The charge to the 'Informing' Panel

Describe and assess different activities, products, strategies, and tools for informing decision makers about climate change and helping them plan and execute effective, integrated responses.

1. **Who is making decisions and taking action on climate change in the United States; what are their needs for information and decision support, and what are the barriers to good decisions?**
2. **What decision making frameworks and methods are being used, and which are the most effective?**
3. **How might climate and greenhouse gas information systems and services support more effective decisions and actions?**
4. **What is known about the most effective ways to communicate about climate change, especially with the public and through formal and informal education?**

Panel Membership

- **DIANA LIVERMAN *(Co-Chair)***, University of Arizona and Oxford University
- **PETER RAVEN *(Co-Chair)*,** Missouri Botanical Garden, Saint Louis
- **DANIEL BARSTOW**, Challenger Center for Space Science Education,
- **ROSINA M. BIERBAUM**, University of Michigan, Ann Arbor
- **DANIEL W. BROMLEY**, University of Wisconsin-Madison
- **ANTHONY LEISEROWITZ**, Yale University, New Haven, Connecticut
- **ROBERT J. LEMPERT**, The RAND Corporation, Santa Monica, CA
- **JIM LOPEZ*,** Department of Housing and Urban Development
- **EDWARD L. MILES**, University of Washington, Seattle
- **BERRIEN MOORE, III**, Climate Central, Princeton, New Jersey
- **MARK D. NEWTON**, Dell, Inc., Round Rock, Texas
- **VENKATACHALAM RAMASWAMY**, Geophysical Fluid Dynamics Laboratory, Princeton, New Jersey
- **RICHARD RICHELS**, Electric Power Research Institute, Inc., Washington, D.C.
- **DOUGLAS P. SCOTT**, Illinois Environmental Protection Agency, Springfield
- **KATHLEEN J. TIERNEY**, University of Colorado at Boulder
- **CHRIS WALKER**, The Carbon Trust LLC, New York, New York
- **SHARI T. WILSON**, Maryland Department of the Environment, Baltimore

*Asterisks denote members who resigned during the study process to take policy-making positions in the federal government.

Main recommendations

Coordinate a comprehensive, nationwide response to climate change

Adopt an iterative risk management approach to climate change

Improve the range and accessibility of tools to support climate choices

Create and improve information systems and services to support limiting emissions, adaptation, and evaluating the effectiveness of decisions and actions

Improve the communication, education, and understanding of climate choices

Who is making decisions about climate change in the US?

	National	Regional	Local	International
Government	Federal agencies, Executive, Congress, Judiciary	Tribal and State governments, regional offices of Federal agencies, interstate networks (e.g., RGGI)	City, county and other local government	Intergovernmental organizations (e.g., World Bank, UNFCCC, ICLEI)
Private Sector	Corporate HQs, national business networks	Regional corporate offices, companies and business associations	Local businesses and associations	Multinational corporations, international business networks (e.g., WBCSD)
Non-profit organizations	Environmental and other NGOs	Regional offices of NGOs, regional organizations	Local NGOs	International environmental and humanitarian organizations and networks (e.g.,Oxfam)
Citizens	Voters, citizen and consumer networks	Voters, citizen networks	Individuals as voters, consumers, agents	International citizens networks

Federal

Example decisions
Whether to participate in international agreements and bilateral/multilateral assistance programs relating to climate change
Whether to regulate GHG emissions and, if so, what policy mechanisms (e.g., cap and trade, carbon taxes, standards, etc.) to use, how these mechanisms are designed, and what agencies and institutions will administer them.
How to adapt to climate change on federal lands and jurisdictions
Priorities for funding research, technology development, and observing systems
What is best way to educate and communicate about climate change to the public

State, tribal and local government

Example decisions
How to control GHG emissions, especially from utilities, transport and buildings, and whether to join regional trading initiatives, and how to encourage citizens to reduce their emissions
How to incorporate climate change into land-use planning, infrastructure projects, disaster planning
How to amend the building code to reduce greenhouse gas emissions and to address the impacts of climate change, including the increased potential for flooding, droughts, high winds, heat waves, and disruption of utility services, as well as the need for buildings to be inhabitable without energy.
Potential information campaigns and educational guidelines

Private sector

Example decisions
How to reduce GHG emissions from operations and supply chains, and whether to participate in regional and global carbon markets and offsetting
How to develop good information for consumers about carbon in products and other sustainable practices
Whether and how to insure climate risks
How and what to communicate about climate change (especially from media and cultural sector)

Individuals

Example decisions
How seriously to judge the threat of climate change and how to weigh current costs against future benefits
How to prepare by adapting homes, lifestyles and landscapes to climate change
What actions to take to reduce their emissions in household energy use, travel, purchase of household goods and food
Should their investments (including pensions) be in portfolios with low climate risk or in climate responsible businesses

State action

	Completed Climate Change Action Plan	Climate Change Commissions and Advisory Board	Emission Reduction Targets	Actively Participates in Regional Initiatives	State Adaptation Plan
Number of states	36 (4 of which are in progress)	23	23	32 (including observers)	15
Examples	Climate action plan to assist state-decision makers identify cost-effective GHG reductions appropriate to their state	Advisory boards to implement climate action plans	Targets and timelines range includes: CA: 1990 levels by 2020 (mandatory) VA: 30% below BAU by 2025 VT: 25% below 1990 by 2012	MGGRA*: 6 (plus one Canadian Province) WCI**: 7 (plus 4 Canadian provinces; and 6 US, 2 Canadian and 6 Mexican observers) RGGI***: 10	Adaptation plans may form part of the Climate Action Plan, although adaptation is not as well developed as mitigation at state level

Business

A QUESTION OF AMERICAN LEADERSHIP

How will America take back control of its energy future while enhancing our national security?

When will the U.S. economy regain its competitive edge instead of letting other countries corner the emerging global clean energy market?

How can we get the U.S. back on track by creating American jobs in the new low-carbon economy?

How can we protect our natural resources and future generations from climate change?

These are the questions we're asking our policy makers as America faces a once-in-a-century opportunity to lower greenhouse gas emissions and become the world's leader in a burgeoning clean energy economy.

We are a broad and diverse group of leading businesses, environmental organizations, national security experts, veterans' organizations, labor unions and faith-based groups.

We believe it's time for Democrats and Republicans to unite behind bi-partisan, national energy and climate legislation that increases our security and limits emissions, as it preserves and creates jobs.

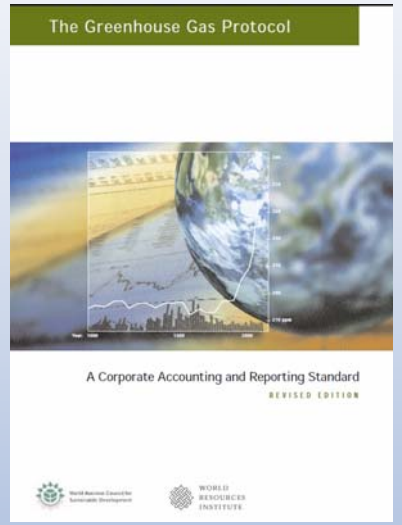
It's a question of American leadership.

A message from the above organizations.

World Business Council for Sustainable Development

Climate Risk Disclosure by the S&P 500

January 2007



The Greenhouse Gas Protocol

A Corporate Accounting and Reporting Standard

REVISED EDITION

2010 Investor Summit on Climate Risk

Final Report

USCAP United States Climate Action Partnership

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Federal decisions and actions

- Congress, Senate, Judiciary
- OSTP, CEQ
- Research (e.g. USGCRP, CCTP)
- Information (e.g. NOAA, DOE, USDA)
- Regulation (e.g. EPA, DOT,SEC)
- Inventory (DOE, EPA)
- Incentives and investment (e.g. USDA, IRS, HUD)
- Emergency response (e.g. FEMA, USAID,DHSS)
- Management of Federal lands and facilities (e.g. DOI, DOD)
- International relations (e.g. State)

Lessons from review of who is making decisions

1. The nation needs access to a broad range of tailored information and tools
2. A patchwork of policies has evolved across the nation
3. There is no consistent and comprehensive way to evaluate the effectiveness of our actions.
4. There is a critical need to coordinate a national response that
    * builds on existing efforts,
    * learns from successes and failures,
    * reduces burdens on any one region or sector,
    * ensures the credibility and comprehensiveness of information and policy.

Recommendation 1: Coordinate a comprehensive, nationwide response to climate change

Improvement in federal coordination and policy evaluation can start by establishing clear leadership and responsibilities at the federal level for climate related decisions, information systems, and services

Establish information and reporting systems that allow for regular evaluation and assessment of the effectiveness of both government and non-governmental responses to climate change

Recommendation 2: Take account of non-federal decisions and actions

Assess, evaluate, and learn from the different approaches to climate related decision making used by non-federal levels of government and the private sector

Enhance non-federal activities that have proven effective in reducing greenhouse gas emissions and adapting to the projected impacts of climate change through incentives, policy frameworks, and information systems

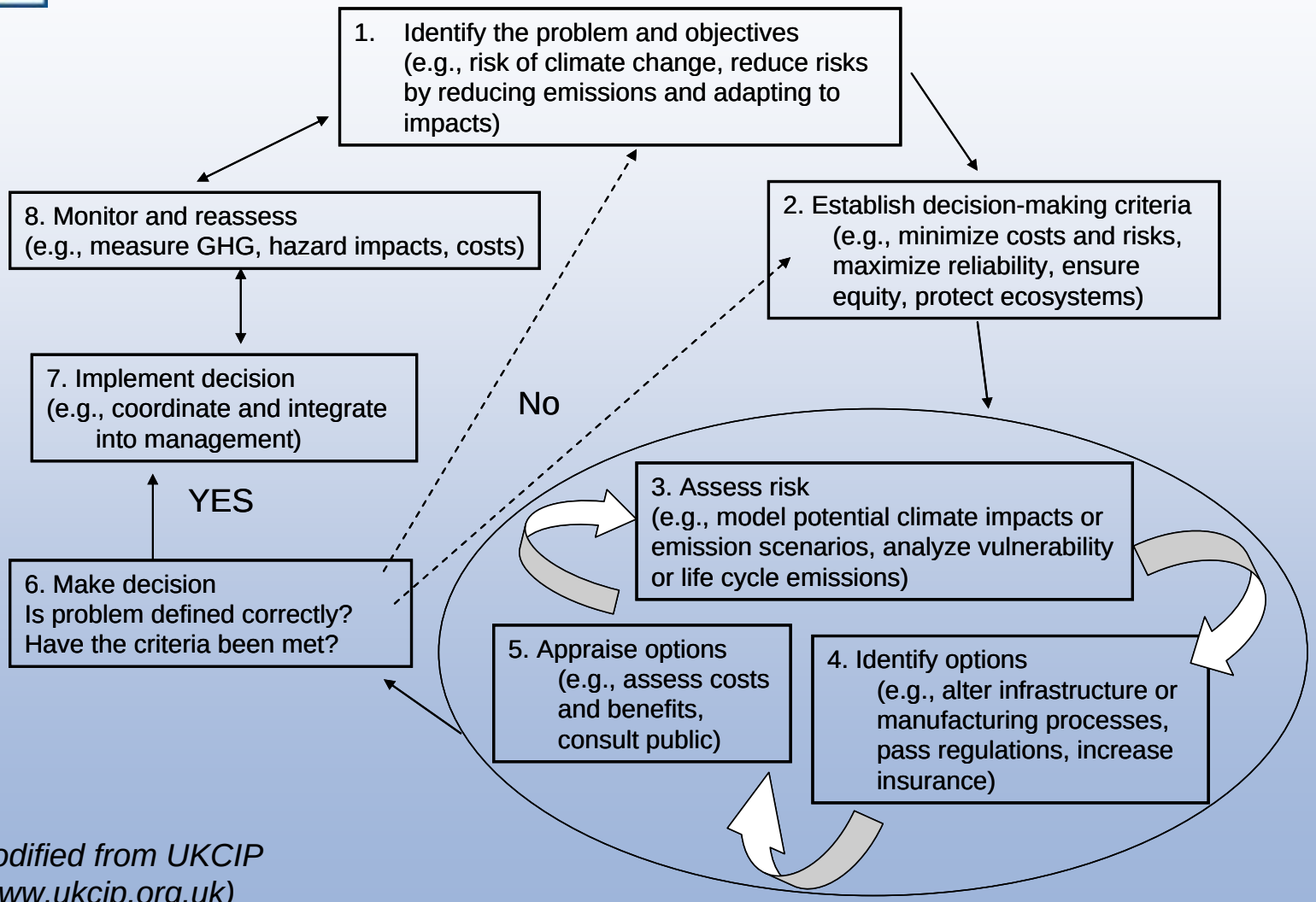
Ensure that proposed federal policies do not unnecessarily preempt effective measures that have already been taken by states, regions, and the private sector

Recommendation 3: Adopt an iterative risk management approach to climate change

Decision makers should implement an iterative risk management strategy to manage climate decisions

Decisions and policies should be revised in light of new information, experience, and stakeholder input

Iterative risk management approach to climate change



Modified from UKCIP (www.ukcip.org.uk)

Recommendation 4: Reassess climate risks

Review and revise federal risk insurance programs (such as FCIC and NFIP) to take into account the long term fiscal and coverage implications of climate change.

The panel endorses the need for climate risk disclosure in the private sector

Tools to support climate choices

- Basic data, statistics and graphics
- Earth system models, impact models, economic models, emission calculators, integrated assessment models
- Assessments
- Expert elicitation and policy simulation
- Deliberative and participatory methods

Recommendation 5: Improve the range and accessibility of tools to support climate choices

The federal government should support research and the development and diffusion of decision support tools and include clear guidance as to their uses and limitations for different types and scales of decision making about climate change.

The federal government should support training for researchers on how to communicate climate change information and uncertainties to a variety of audiences using a broad range of methods and media.

Create or improve information systems and services

- Climate services
- Greenhouse gas information systems
- Consumer information relating to greenhouse gas emissions
- Information about the International context

Recommendation 6: Climate services

The nation needs to establish a coordinated system of climate services that

- involves multiple agencies and regional expertise
- is responsive to user needs
- has rigorous scientific underpinnings (in climate research, vulnerability analysis, decision support, and communication)
- performs operational activities (timely delivery of relevant information and assessments)
- can be used for ongoing evaluation of climate change and climate decisions
- has an easily accessible information portal that facilitates coordination of data among agencies and a dialogue between information users and providers

Summary of Core Climate Service Functions

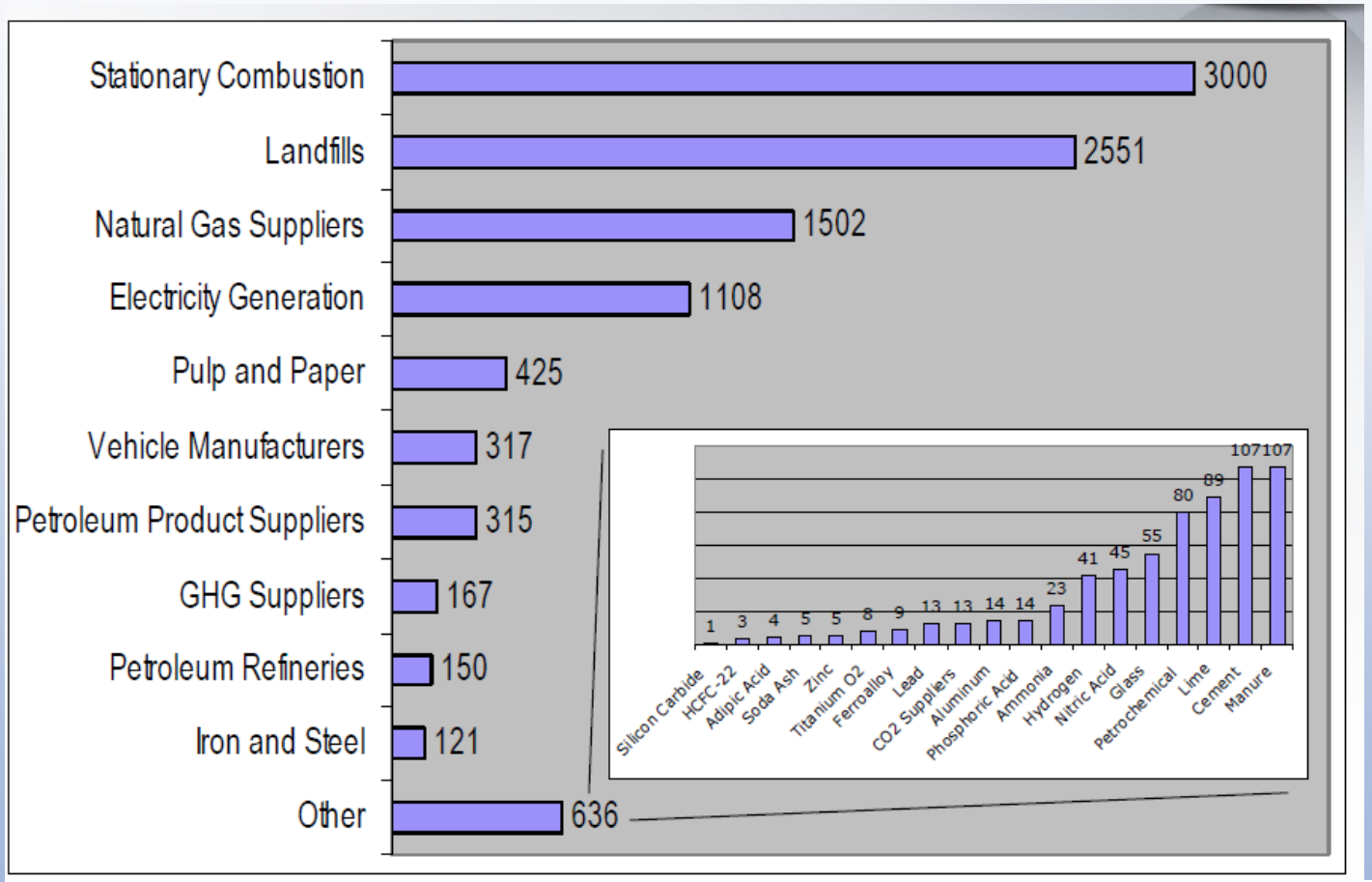
- A user-centered focus that responds to the decision making needs of government and other actors at national, regional, and local scales
- Research on user needs, response options, effective information delivery mechanisms, and processes for sustained interaction with multiple stakeholders
- Enhanced observations and analyses designed specifically to provide timely, credible, authoritative, relevant, and regionally useful information on climate change and vulnerability, and effectiveness of responses
- Trustworthy and timely climate modeling and research to support federal decision making about limiting emissions and adaptation
- A central and accessible web portal of information that includes a system for sharing response strategies and access to decision support tools
- Capacity building and training for linking knowledge to action across the nation
- An international information component.

Recommendation 7 : Greenhouse gas information systems

The nation should establish a federally supported system for greenhouse gas monitoring, reporting, verification, and management

The system should include the establishment of a unified (or regionally and nationally harmonized) greenhouse gas emission accounting protocol and registry

EPA Greenhouse Gas Reporting Program



http://epa.gov/climatechange/emissions/downloads/FinalMRROverview.pdf

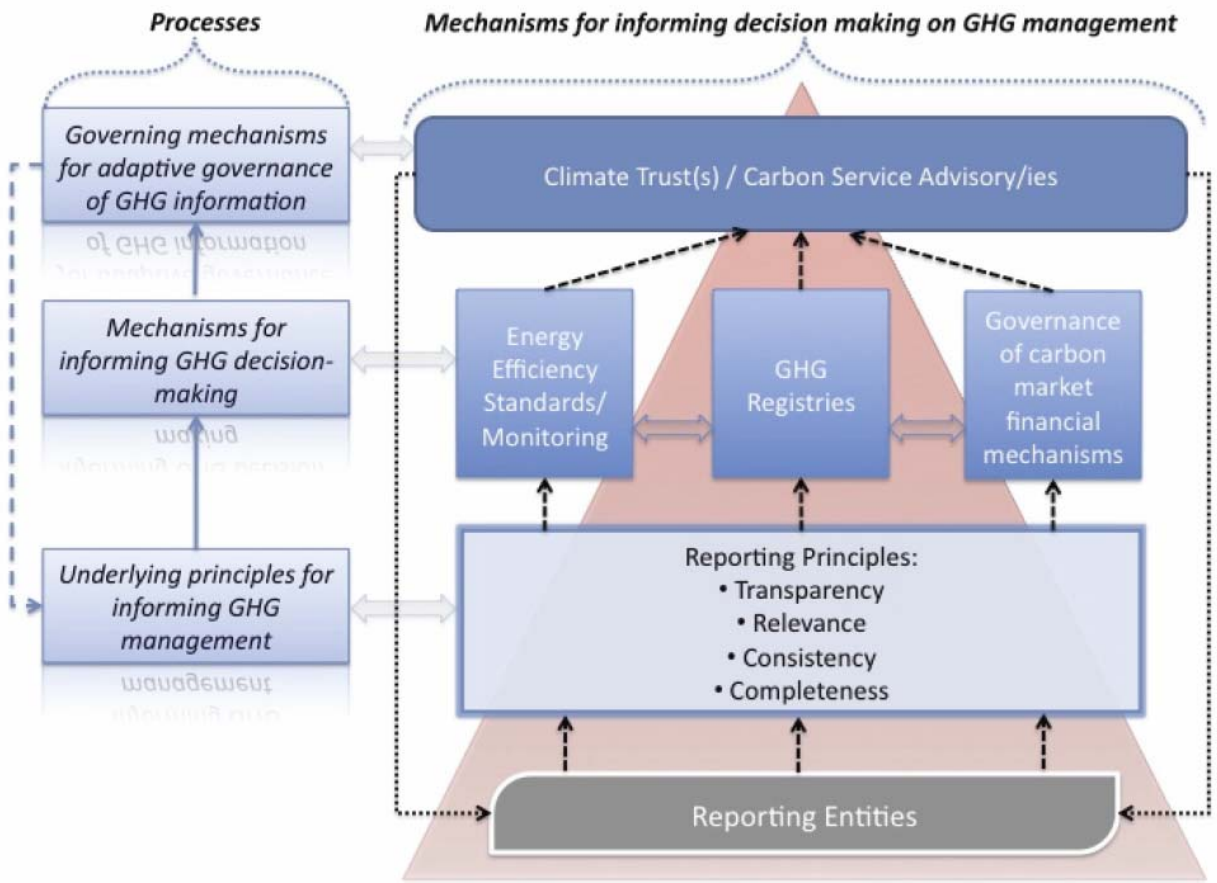


FIGURE 6.1. A conceptual diagram to illustrate the principles underlying greenhouse gas (GHG) reporting and accounting, mechanisms for reporting emissions information, and governance structures for GHG information systems. Black dashed arrows represent the transfer of emissions information collected by various entities (e.g., companies, local governments, non-governmental organizations) for different purposes (energy efficiency, registries, carbon markets) to overarching administrative bodies. The overarching bodies (created at state or federal levels) provide feedback and assistance on data collection (black dotted arrows). The blue dashed arrow illustrates the adaptive governance approach needed to respond to changing conditions and circumstances. The red triangle illustrates the increasing usefulness of GHG emissions information. This heuristic diagram is not meant to represent all the linkages between components of the GHG management chain.

Elements of an Effective Greenhouse Gas Accounting System

- Accounting principles to allow accurate, transparent, relevant, consistent, and accessible information;
- A strong scientific basis in research on greenhouse gas science, monitoring, and the design of accounting systems;
- A national accounting system and standards to report the full range of greenhouse gas emissions using consistent methods, boundaries, baselines, and acceptable thresholds;
- Information available at the zip code and firm level;
- High-quality verification schemes, including for carbon offsets, agricultural land use and forests;
- Methods to facilitate greenhouse gas management in supply chains and to control emissions at the most effective stage in the production-consumption chain;
- A national greenhouse gas registry to track emissions from specific entities, support a variety of policy choices, and link to international systems that might benefit American firms and citizens;
- Ongoing evaluation and feedback with users to support adaptive management and to adapt to new science and monitoring technologies.

Recommendation 8: Consumer information on greenhouse gas emissions

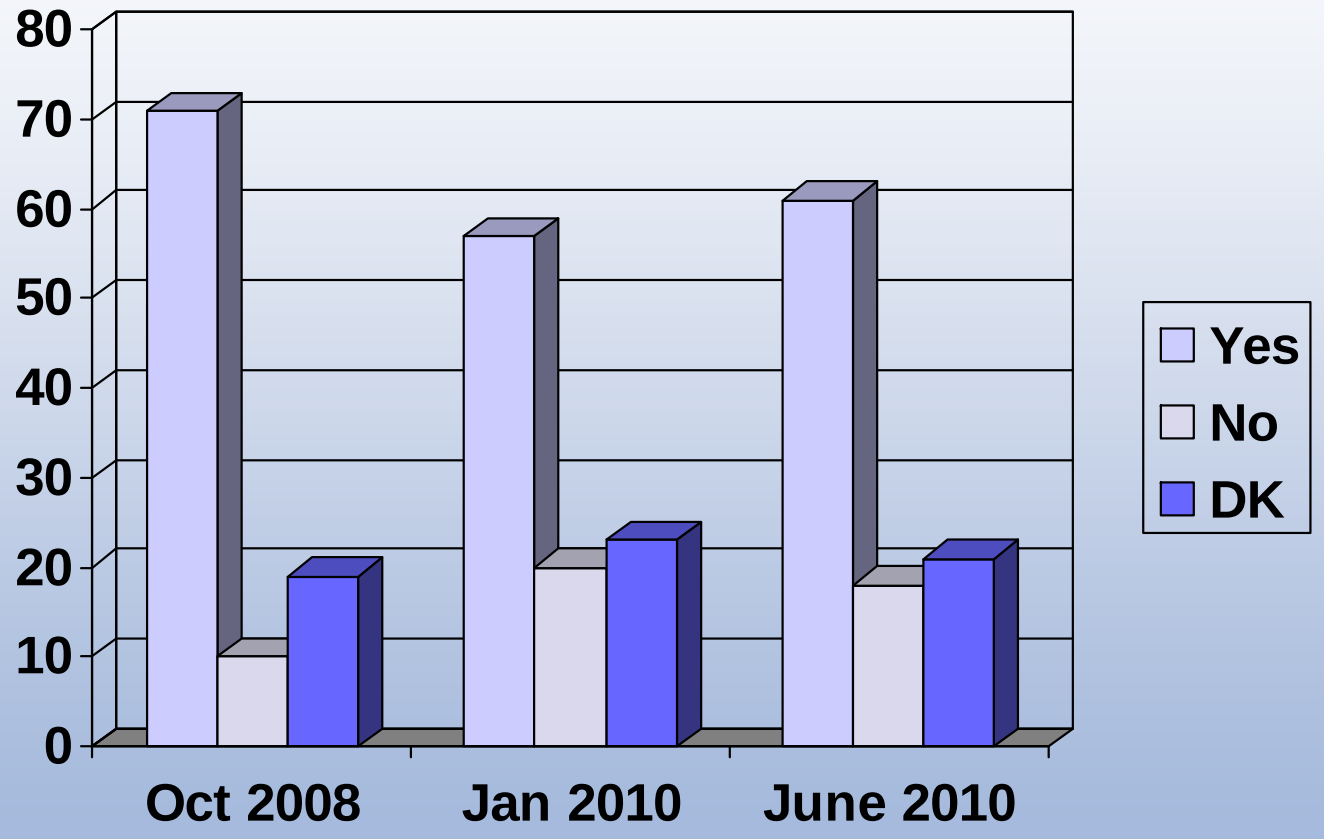
The federal government should review and promote credible and easily understood standards and labels for energy efficiency and carbon/ greenhouse gas information

The federal government should also consider the establishment of a carbon or greenhouse gas advisory service targeted at the public and small and medium enterprises

Recommendation 9: The federal government should support the collection and analysis of international information

- climate observations, model forecasts, and projections
- the state and trends in biophysical and socioeconomic systems
- research on international climate policies, response options and their effectiveness
- climate impacts and policies in other countries of relevance to U.S. decision makers

American attitudes to climate change: Is global warming happening?



Leiserowitz, A., Maibach, E., Roser-Renouf, C., & Smith, N. (2010) *Climate change in the American Mind: Americans' global warming beliefs and attitudes in June 2010.* Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication. http://environment.yale.edu/climate/files/ClimateBeliefsJune2010.pdf

Recommendation 10: A national task force on climate change education and communication

The federal government should establish a national task force that includes formal and informal educators; government agencies, policymakers, business leaders, and scientists, among others, to set national goal and objectives, and to develop a coordinated strategy to improve climate change education and communication

Guidelines for effective climate change communication

Know your audience: Learn what people (mis)understand and their information needs.
Understand social identities and affiliations: Effective communicators often share an identity and values with the audience.
Get the audience's attention: Use appropriate framing to make information relevant to different groups
Use the best available, peer-reviewed science: Use recent and locally relevant research.
Translate scientific understanding and data into concrete experience: Use imagery, analogies, and personal experiences.
Address scientific and climate uncertainties: Specify what is known with high confidence and what is less certain.
Avoid scientific jargon and use everyday words: degrees F rather than degrees C, *human caused* rather than *anthropogenic.*
Maintain respectful discourse: Climate change decisions involve diverse perspectives and values.
Provide choices/solutions: Present options and discuss alternatives.
Encourage participation: Listen to audience concerns and ideas. Don't overuse slides and one-way lectures.
Use popular channels: Use new social media and the internet.
Evaluate communications: Assess and revise as needed.

Take home messages

A robust U.S. response to climate change requires:

1. **All actors - local to global, public and private**
2. **Informed decision making based on iterative risk management**
3. **Reliable, understandable, and timely climate-related information tailored to user needs (e.g. climate services and GHG accounting system) to evaluate the effectiveness of our actions**
4. **Better communication and education about climate change**

For more information:

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Report available from
National Academy Press
www.nap.edu