Science For Policy Project

Interim Report
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IMPROVING THE USE OF SCIENCE IN REGULATORY POLICY

The use of science in the formulation of regulatory policy – by both the Executive Branch and the Congress – has become a political flashpoint in recent decades. Policy makers often claim that particular regulatory decisions have been driven by, or even required by science; their critics, in turn, have attacked the quality or the interpretation of that science. Such conflict has left the U.S. with a system that is plagued by charges that science is being "politicized" and that regulation lacks a solid scientific basis. As a result, needed regulation may be stymied, dubious regulations may be adopted, issues can drag on without conclusion and policy debate is degraded. Moreover, the morale of scientists is weakened, and public faith in both government and science is undermined.

These problems are largely systemic; they will not magically vanish with a change of Administrations or a shift in the composition of the Congress. But the advent of a new Administration and a new Congress is an opportune time to take stock of the situation and to try to devise ways to get beyond the predictable battles that would otherwise lie ahead. The use of science in regulatory policy is another area in which government needs to get beyond the stale debates and false dichotomies of the past. The question is not whether scientific results should be used in developing regulatory policy, but how they should be used.

New processes are needed – approaches that will be seen as legitimate by most stakeholders on all sides of issues and that will make policy making more transparent. A critical goal of any new procedures for establishing regulatory policy must be to clarify which aspects of a regulatory issue are matters of science and which are matters of policy (e.g., economics or ethics). The tendency, on all sides, to frame regulatory issues as debates solely about science, regardless of the actual subject in dispute, is at the root of the stalemate and acrimony all too present in the regulatory system today.

To come up with new approaches, the Bipartisan Policy Center assembled a diverse panel of experts to develop recommendations for both the Executive Branch and the Congress on how to improve the way science is used in making regulatory policy across the government's areas of responsibility. The panel includes liberals and conservatives, Republicans and Democrats, scientists and policy experts, and leaders with experience in government, industry, academia and non-governmental organizations..

The goal of the panel is to issue a report this summer with specific recommendations for both the Executive Branch and Congress. That report will be designed to answer three sets of questions concerning regulatory policy. (By "regulatory policy," we mean not only specific rules, but all regulatory statements and guidance issued by Administration officials, and statements, hearings and legislation from the Congress.) Those questions are:

- What kinds of activities or decision-making amount to "politicizing" science? How and to what extent can one differentiate between the aspects of

regulatory policy that involve scientific judgments and those that involve making policy recommendations (which are inherently political)?

- When and how should Federal agencies empanel advisory committees? How should members be selected? How should conflicts of interest and biases of potential members be handled? What is scientific balance and how can it be achieved? How can the independence and integrity of committees' deliberations be assured?

- What studies should agencies and advisory committees review in formulating regulatory policy? How should they be weighed? What role should peer review play and how might peer review be modified and strengthened?

The panel met for the first time in January and therefore still has much work to do to formulate specific policies and procedures that respond to these questions. But the panel did get far enough to lay out some initial general guidance for the new Administration. (Again, the final report will provide recommendations for the Congress as well as expanding on suggestions for the Administration.) Note that in the recommendations below, "science" refers to the natural and physical sciences and engineering. The panel's ultimate recommendations may also deal with the social sciences.

RECOMMENDATION ONE: The Administration needs to develop ways, when developing regulatory policies, to explicitly differentiate, to the extent possible, between questions that involve scientific judgments and questions that involve judgments about economics, ethics and other matters of policy.

Political decision-makers should never dictate what scientific studies should conclude, and they should base policy on a thorough review of all relevant research and the provisions of the relevant statutes. But some disputes over the "politicization" of science actually arise over differences about policy choices that science can inform, but not determine. For example, decisions about how much risk society should tolerate or what actions should be taken in the face of scientific uncertainty are not science questions, rather they concern policies and values. Matters such as risk and uncertainty need to be informed by scientific results, but science cannot tell policy makers how to act. True, distinguishing between science and policy is not always easy or straightforward, and scientists may make choices based on values in the course of their work. Nonetheless, policy debate would be clarified and enhanced if a systematic effort were made to distinguish between questions that can be resolved through scientific judgments and those that involve judgments about values and other matters of policy when regulatory issues comprise both. This transparency would both help force values debates into the open and could limit spurious claims about, and attacks on science. It would also help policy makers determine which experts to turn to for advice on regulatory questions, and what kinds of questions they should be expected to answer.

The Administration needs to devise regulatory processes that, in as many situations as possible, could help clarify for both officials and the general public which aspects of disputes are truly about scientific results and which concern policy. That distinction also needs to be spelled out in regulatory documents. One approach that could help clarify the often problematic distinction would be to require policymakers to answer questions such as: What additional science would change the debate over a proposed regulatory policy and in what ways would the debate change? This both would help to pinpoint the nature and extent of scientific uncertainty and would highlight which aspects of a regulatory issue are not primarily about science.

Another possible approach would be to require federal agencies to spell out genuine alternative regulatory policies when proposing guidance or a rule. The idea would be to make clear the range of policy options that were available, given the science and the requirements of law. For example, agencies could be required to describe alternatives of different levels of stringency (or cost, when allowed by statute) that would be in keeping with the science and would comply with statutory mandates.

Many additional options for implementing Recommendation One might be developed, but the goal should be to change the conversation about regulation and to inculcate new habits of thought. The first impulse of those concerned with regulatory policy should not be to claim "the science made me do it" or to dismiss or discount scientific results, but rather to publicly discuss the policies and values that legitimately affect how science gets applied in decision making.

No system for clarifying the roles of science and policy questions in regulatory decision making will be air tight or completely immune from abuse. But that is not a reason to adhere to the status quo. Unless clarifying science and policy issues becomes a central aspect of regulatory policy discussions, it will be very difficult to get beyond the finger-pointing and misleading debates that have been a barrier to sensible policy making for so long. In short, there must be clarity and transparency about the roles of policy and science in regulatory decisions for science to be appropriately integrated in regulatory policy.

<u>RECOMMENDATION TWO: The Administration needs to develop guidelines on when to consult advisory panels on scientific questions, how to appoint them, how they should operate, and how to deal with conflicts of interest</u>.

Federal agencies should use advisory committees to the maximum extent possible to review the science behind regulatory policies that are under consideration. (At the same time, agencies should be working to strengthen the internal capabilities of their staffs, including their scientists.) Public officials should not delegate their ultimate responsibility to set policy. But scientific advisory committees can help ensure that policies are based on a range of knowledge and opinions, and they can make the regulatory process more transparent. As a result, the proper use of advisory committees can make it easier to adopt and more difficult to overturn good regulations once promulgated.

The first question in establishing an advisory committee should be whether the group will handle science questions or policy questions (or perhaps both). Science and policy questions should be as clearly distinguished as possible in charges to advisory panels. Advisory committees that are exclusively addressing science questions should generally consist only of members with relevant scientific expertise. Advisory committees that are addressing policy questions that are informed by science should include members with relevant scientific expertise among their members.

In general, scientific advisory panels should not be asked to recommend specific policies. Rather, they should be empanelled to reach conclusions about the science that would guide a policy decision. They might also be charged with evaluating a regulatory option or options developed by federal officials in light of scientific understanding. For example, a scientific advisory panel might be asked to determine if a proposed standard was consistent with achieving a level of risk prescribed by federal officials.

The remainder of this section is concerned exclusively with procedures related to scientific advisory panels.

The process of naming advisory committees should be made more transparent. Options for accomplishing this include: seeking recommendations for members on the Web or through contacts with relevant groups; publicly announcing on the Web the criteria for membership (such as the range of scientific disciplines that need to be included); and announcing proposed members on the Web to allow for public comment. While some agencies use some of these techniques some of the time today, greater transparency needs to become the norm, and processes need to become more uniform.

Achieving balance among scientific disciplines is more essential than is commonly understood. Such balance not only ensures that the full range of science will inform a decision, but also guards against advice being unconsciously biased by the perspectives, values or techniques that may be inherent in particular fields. It is also critical to identify a chair who is widely respected, has a reputation for considering all perspectives, and can manage a committee so as to encourage debate and discussion yet produce results on schedule.

Publicizing proposed committee members is also a way to learn of possible conflicts of interest. Our panel is still considering how agencies should handle such conflicts. Views run the gamut from allowing anyone with a conflict to serve on an advisory panel as long as the conflict is disclosed to banning anyone with a conflict from an advisory panel (while allowing the panel to hear and evaluate that person's views). We hope our final report can offer more specific guidance on how to assess and handle conflicts.

Without question, though, the Administration should set a clear, rigorous, uniform government policy on conflict of interest and create a standard form for disclosure that could be used by all advisory committees and in all agencies (or that, at the very least, would set a minimum standard for all agencies). The Administration should examine the

range of conflict policies used by federal agencies, scientific journals and international scientific bodies in developing its policy. Any policy should clearly define what constitutes a conflict of interest that must be disclosed (including the time period covered, any monetary thresholds, and what family members and professional associates are included), what conflicts would be disclosed to the public as well as the government, and what conflicts, if any, would disqualify an individual from serving on an advisory committee.

Agencies need to check more effectively for conflicts on the part of advisory committee members. Scientists should be far more sensitive to the need to disclose conflicts, but federal agencies should not be relying exclusively on self-disclosure to ensure that federal guidelines on disclosure are being followed.

Federal officials who select members of scientific advisory committees should consider biases in addition to financial conflicts of interest. The policies of the National Academy of Sciences helpfully distinguish between conflicts and biases, which arise, for example, when a potential advisory committee member has a record of taking sides on an issue. Having published views on a matter should not, in and of itself, be a barrier to participating on a related advisory committee. Rather, advisory committees should have a diversity of perspectives, and members should be expected to be open-minded, regardless of their previous work.

The Administration should also carefully think through efforts to ensure open meetings of advisory committees. It might be worth considering, for example, whether some scientific advisory committees could be allowed to hold some closed meetings if the selection process for committee membership were more open than it generally is today (as recommended above). Transparency is an essential principle of democratic governance, but some deliberations can benefit from a modicum of private discussion to enable committee members to think and speak more freely and open-mindedly. Allowing the closure of meetings would require changes in statute, and any such changes should limit the use of closed meetings and be very specific about when closure is permissible.

The recommendations of a committee, though, must always be made public (assuming no classified information is involved), and indeed committees should be required to explain fully their methodology and the rationale for their conclusions. Federal officials should be required to explain how a committee's conclusions or recommendations are embodied in a new regulatory policy or why they are not.

Finally, federal officials must give advisory committees clear, definite and realistic deadlines for reporting and clear information on when a committee report will be released and how it will be used.

One way the Administration might approach some of the issues raised here is to review the guidance that the Office of Management and Budget and the Office of Science and Technology Policy issued in 2003 to see how it might be improved.

RECOMMENDATION THREE: Agencies and advisory committees should cast a wide net in reviewing studies relevant to regulatory policy and must improve their methods of filtering and evaluating those studies.

Our panel is just beginning to discuss how to flesh out this recommendation. However, a few general principles have emerged.

Not all studies should be given equal weight in surveying a field. To the extent possible, agencies and advisory committees should set out criteria in advance for reviewing the quality and relevance of individual studies and then should apply those criteria systematically in evaluating and synthesizing the research. Among the factors that need to be considered are where a study was published, the quality of the peer review it underwent, any conflicts of interest the scientists conducting the study may have had and whether such conflicts were disclosed, and the extent to which a study's findings are supported by other work, and whether such work was published in peer reviewed journals.

Policymakers should be wary of conclusions about risk that are expressed as a single number. Rather, risk should be expressed as a range, with different scenarios and assumptions for different risk levels spelled out. Reviews of a body of scientific literature should always express levels of uncertainty as clearly and fully as possible so that policymakers can then discuss their response to that uncertainty.

Science-Policy Project Member Biographies
Bipartisan Policy Center

Panelists

Sherwood Boehlert (co-chair)

Former Congressman Sherwood Boehlert (R-NY) represented Central New York State in the U.S. House of Representatives for 12 terms, ending in 2006. He served on the House Science Committee for his entire Congressional career and in 2001 was elected its Chairman. In addition, he was third-ranking member of the House Transportation and Infrastructure Committee. From 1995 to 2000 he served as Chairman of the Subcommittee on Water Resources and Environment. Boehlert was also a long-time member of the House Permanent Select Committee on Intelligence and a founding member of the House Select Committee on Homeland Security. *Congressional Quarterly* named him one of the 50 Most Effective Lawmakers on Capitol Hill; *National Journal* dubbed the long-time environmental leader "The Green Hornet," and *Time* magazine cited him as a go-to "power center" in the House. In 2007, Boehlert joined The Accord Group, where he is Of Counsel. Additionally, the former lawmaker serves with former Rep. Martin Sabo, former Sen. Slade Gordon, and former Detroit Mayor Dennis Archer as Co-chair of the Bipartisan Policy Center's Transportation Project for the 21st century. Boehlert is a Board Member of a number of national organizations, including the Alliance for Climate Protection; the Heinz Center for Science, Economics and the Environment; the League of Conservation Voters; the Health Effects Institute and the Natural Resources Defense Council Action Fund.

Donald Kennedy (co-chair)

Donald Kennedy is the former editor-in-chief of *Science*, the journal of the American Association for the Advancement of Science, and a senior fellow of the Woods Institute for the Environment at Stanford University. His present research program entails policy on such trans-boundary environmental problems as: major land-use changes; economically-driven alterations in agricultural practice; global climate change; and the development of regulatory policies. Dr. Kennedy has served on the faculty of Stanford University since 1960. From 1980 to 1992 he served as President of Stanford University. He was Commissioner of the U.S. Food and Drug Administration from 1977-79. Previously at Stanford, he was Director of the Program in Human Biology from 1973-77 and Chair of the Department of Biology from 1964-72. Kennedy is a member of the National Academy of Sciences, the American Academy of Arts and Sciences, and the American Philosophical Society. He served on the National Commission for Public Service and the Carnegie Commission on Science, Technology and Government, and as a founding Director of the Health Effects Institute. He currently serves as a Director of the Carnegie Endowment for International Peace, and as Co-chair of the National Academies' Project on Science, Technology and Law.

Arthur Caplan

Arthur Caplan is the Emanuel and Robert Hart Professor of Bioethics, Chair of the Department of Medical Ethics and the Director of the Center for Bioethics at the University of Pennsylvania. Prior to coming to Penn in 1994, Dr. Caplan taught at the University of Minnesota, the University of Pittsburgh, and Columbia University. He was the Associate Director of the Hastings Center from 1984-87. Dr. Caplan is the author or editor of 25 books and over 500 papers in refereed journals of medicine, science, philosophy, bioethics and health policy. His most recent book is *Smart Mice Not So Smart People* (Rowman Littlefield, 2006). He has served on many national and international committees including as the Chair of the National Cancer Institute Biobanking Ethics Working Group, the Chair of the Advisory Committee to the United Nations on Human Cloning, the Chair of the Advisory Committee to the Department of Health and Human Services on Blood Safety and Availability, and a member of the Presidential Advisory Committee on Gulf War Illnesses. He is a member of the Board of Directors of The Keystone Center, Tengion, the National Center for Policy Research on Women and Families, Octagon, the Iron Disorders Foundation, and the National Disease Research Interchange. He writes a regular column on bioethics for MSNBC.com. Dr. Caplan is the recipient of many awards and honors including the McGovern Medal of the American Medical Writers Association, Person of the Year-2001 from *USA Today*, one of the 50 most influential people in American health care by *Modern Health Care* magazine, one of the 10 most influential people in America in biotechnology by the *National Journal* and one of the ten most influential people in the ethics of biotechnology over the past ten years by the editors of the journal *Nature Biotechnology*.

Linda J. Fisher

Linda J. Fisher is Vice President and Chief Sustainability Officer at E. I. du Pont de Nemours and Company. She has responsibility for advancing DuPont's progress in achieving sustainable growth, DuPont's environmental and health programs, the company's product stewardship programs, global regulatory affairs, and government affairs. She joined DuPont in 2004. Prior to that, Fisher served in a number of key leadership positions in government and industry including: Deputy Administrator of the Environmental Protection Agency (EPA) from 2001-03; EPA Assistant Administrator - Office of Prevention, Pesticides and Toxic Substances; EPA Assistant Administrator - Office of Policy, Planning and Evaluation; and Chief of Staff to the EPA Administrator. Fisher, an attorney, was also Vice President of Government Affairs for Monsanto and was Of Counsel with the law firm Latham & Watkins. She is a member of the DuPont Health Advisory Board and the DuPont Biotechnology Advisory Panel and serves as liaison to the Environmental Policy Committee of the DuPont Board of Directors. Fisher serves on the Board of Directors of the Environmental Law Institute, on the Board of Trustees of The National Parks Foundation, on the Board of Directors of Resources for the Future, and on the Board of Covanta Holdings.

Lynn R. Goldman
Lynn R. Goldman, a pediatrician and epidemiologist, is Professor in the Department of Environmental Health Sciences at the Johns Hopkins University Bloomberg School of Public Health. Her areas of focus are public health practice, children's environmental health, disaster preparedness, and chemical and pesticide regulatory policy. Dr. Goldman is Principal Investigator for the Hopkins National Children's Study Center and co-PI of the Center for Preparedness and Catastrophic Event Response (PACER). As Assistant Administrator for Toxic Substances at EPA, she directed the Office of Prevention, Pesticides and Toxic Substances from 1993 through 1998. Prior to joining EPA, Dr. Goldman served as Chief of the Division of Environmental and Occupational Disease Control of the California Department of Health Services. Dr. Goldman has served on numerous boards and expert committees, including the Committee on Environmental Health of the American Academy of Pediatrics and the Centers for Disease Control Lead Poisoning Prevention Advisory Committee. Dr. Goldman is a member of the Institute of Medicine, Vice Chairman of the Institute of Medicine Roundtable on Environmental Health Sciences, and a member of the National Academy of Sciences Standing Committee on Risk Analysis Issues and Reviews.

John D. Graham
John D. Graham is Dean of the Indiana University School of Public and Environmental Affairs (SPEA). His research interests include government reform, energy and the environment, and the future of the automobile in both developed and developing countries. He came to SPEA after serving as Dean of the Frederick Pardee RAND Graduate School at the RAND Corporation in California. Prior to joining RAND, Dr. Graham served in the White House Office of Management and Budget (OMB) from 2001-06. As the Senate-confirmed Administrator of the Office of Information and Regulatory Affairs, he led a staff of 50 career policy analysts who reviewed major regulatory proposals from Cabinet agencies. Prior to his role at OMB, Dr. Graham was a Professor of Policy and Decision Sciences at the Harvard School of Public Health. From 1990 to 2001, Dr. Graham founded and led the Harvard Center for Risk Analysis. In 1995, he was elected President of the Society for Risk Analysis, an international membership organization of 2,400 scientists and engineers.

Daniel Greenbaum
Dan Greenbaum joined the Health Effects Institute (HEI) as its President and Chief Executive Officer in 1994. In that role, Greenbaum leads HEI's efforts, supported jointly by the EPA and industry, with additional funding from the Department of Energy, Federal Highway Administration, U.S. Agency for International Development, the Asian Development Bank, and foundations, to provide public and private decision makers with high quality, impartial, relevant and credible science about the health effects of air pollution. Greenbaum has focused HEI's efforts on providing timely and critical research and reanalysis on particulate matter, air toxics, diesel exhaust and alternative technologies and fuels. Greenbaum currently serves on the U.S. National Research Council (NRC) Committee on Health, Environmental, and Other External Costs and Benefits of Energy Production and Consumption. He has been a member of the NRC Board of Environmental Studies and Toxicology and Vice Chair of its Committee for Air Quality Management in the United States. Greenbaum also chaired the EPA Blue Ribbon Panel on Oxygenates in Gasoline, which issued the report "Achieving Clean Air and Clean Water" and EPA's Clean Diesel Independent Review Panel, which reviewed technology progress in implementing the 2007 Highway Diesel Rule. Before coming to HEI, he was Commissioner of Environmental Protection in Massachusetts.

Michael P. Holsapple
Michael P. Holsapple is the Executive Director of the International Life Sciences Institute's Health and Environmental Sciences Institute (HESI) in Washington, D.C. Dr. Holsapple has published over 150 manuscripts and chapters. After completing two years of postdoctoral work at the Medical College of Virginia/Virginia Commonwealth University, he was appointed an Assistant Professor in the Department of Pharmacology and Toxicology. He was tenured and promoted to Associate Professor in 1989. Dr. Holsapple served as the Director of his department's graduate program from 1987 until 1991, and he received the "Professor of the Year Award" in his department in 1989. Dr. Holsapple joined the Toxicology, Environmental Research and Consulting Laboratories at the Dow Chemical Company in 1994 and was promoted to Scientist in 2000. His responsibilities included serving as the Technical Leader of both the Immunotoxicology and the Respiratory Toxicology Groups. Dr. Holsapple left Dow in 2002 to join the HESI staff. Dr. Holsapple is currently an Adjunct Professor in the Department of Pharmacology and Toxicology at Michigan State University. He is a member of the American College of Toxicology and the Society of Toxicology (SOT). He is a charter member of the Immunotoxicology Specialty Section in the SOT. In recognition of his contributions to toxicology, Dr. Holsapple received the SOT Achievement Award in 1992. Dr. Holsapple became the Vice President-elect of SOT in 2008.

Kevin Knobloch
Kevin Knobloch is the President of the Union of Concerned Scientists (UCS). Mr. Knobloch first worked at UCS from 1989 to 1992 as Legislative Director for Arms Control and National Security. He returned in January 2000 and was named President in December 2003. He oversees the organization's research, public education, and legislative programs. Knobloch recently served as Chair of the Green Group, a coalition of the CEOs of 34 national environmental organizations, and currently serves as Co-chair of the Green Group Climate and Energy Committee. He led UCS delegations to the United Nations International Climate negotiations in Montreal in 2005 and in Bali in 2007. In addition to his positions at UCS, he served as Director of Conservation Programs for the Appalachian Mountain Club in Boston. During six years on Capitol Hill, he was the Legislative Director for U.S. Senator Timothy Wirth (D-CO) and Legislative Assistant and Press Secretary for U.S. Representative Ted Weiss (D-NY). He began his career as an award-winning newspaper journalist, writing for several Massachusetts publications. He recently completed eight years on the Board of Directors of the Coalition for Environmentally Responsible Economies and serves on the Environmental League of Massachusetts Board of Directors. He is also co-founder and former President of the Arlington (MA) Land Trust.

Kenneth Olden
Kenneth Olden has been the Founding and Acting Dean of the proposed School of Public Health at the City University of New York since 2008. Dr. Olden is a cell biologist and biochemist by training, and has been active in cancer research for over three decades. From 1979 to 1991, Dr. Olden worked at Howard University in several roles, ultimately as Director of the Howard University Cancer Center and Chairman of the Department of Oncology. From 1991 to 2005, Dr. Olden was Director of the National Institute of Environmental Health Sciences (NIEHS) and the National Toxicology Program, with a concurrent scientific post as Chief of the Metastasis Section of the NIEHS Environmental Carcinogenesis Program. Dr. Olden has maintained his research interests throughout his administrative career. Much of his work has focused on the role of glycoproteins in cancer. Working with Ken Yamada and others at the National Cancer Institute, he studied the glycoprotein fibronectin, and its possible role in inhibiting metastasis.

Roger A. Pielke, Jr.
Roger A. Pielke, Jr. has been on the faculty of the University of Colorado since 2001 and is a Professor in the Environmental Studies Program and a Fellow of the Cooperative Institute for Research in Environmental Sciences (CIRES). At CIRES, Dr. Pielke served as the Director of the Center for Science and Technology Policy Research from 2001-07. His research focuses on the intersection of science and technology and decision making. In 2006, Dr. Pielke received the Eduard Brückner Prize in Munich, Germany for outstanding achievement in interdisciplinary climate research. Before joining the University of Colorado, from 1993-2001, he was a Scientist at the National Center for Atmospheric Research. Dr. Pielke is an Associate Fellow of the James Martin Institute for Science and Civilization at Oxford University's Said Business School. He is also a 2008 Fellow of the Breakthrough Institute. He is also author, co-author or co-editor of five books. His most recent book is *The Honest Broker: Making Sense of Science in Policy and Politics*.

Sherri K. Stuewer
Sherri Stuewer is Vice President - Safety, Health and Environment for Exxon Mobil Corporation. In that role she is responsible for developing, reviewing, and coordinating ExxonMobil's worldwide efforts concerning the environment, safety, and health. Prior to her current position, Stuewer was Strategic Planning Manager for ExxonMobil, General Manager of the Exxon Company U.S.A. supply department, and Manager of the Exxon refinery in Baytown, Texas. Over her 33-year career with ExxonMobil, she has held a variety of technical and managerial positions in refining, planning, and logistics. Stuewer is a member of the Board of Trustees and the Engineering College Council at Cornell University. She is also a Board Member of the YMCA of Metropolitan Dallas and the Bermuda Institute of Ocean Sciences. She is a past Chair of the Industry Advisory Board to the International Energy Agency.

Wendy E. Wagner

Wendy E. Wagner is the Joe A. Worsham Centennial Professor at the University of Texas School of Law and recently joined the Case Law School faculty as a Professor through a joint, half-time arrangement with the University of Texas. Prior to joining the University of Texas Law faculty, Wagner was a Professor at the Case Western Reserve University School of Law and School of Management, and was a Visiting Professor at the Columbia Law School and the Vanderbilt Law School. She writes primarily in the area of environmental law and science, exploring the ways that science is used and misused in decision-making by the courts, Congress, and the agencies. Wagner has participated as an officer or committee member in a number of professional societies, including several sections of the American Bar Association, the Society for Risk Analysis, the National Conference of Lawyers and Scientists, and has served on several National Academy of Sciences committees. Wagner began her legal career in 1987, when she served as a law clerk for the Honorable Albert Engel, the Chief Judge of the U.S. Court of Appeals, Sixth Circuit, in Grand Rapids, Michigan. She then served as an Honors Attorney at the Environmental Enforcement Section of the Environment Division at the Department of Justice in Washington, D.C. Wagner then moved to the General Counsel Office of the Department of Agriculture (USDA) in 1991 where she served as the Pollution Control Coordinator and established a central office, with six satellite legal offices, to manage and advise USDA agencies on compliance under the pollution control laws.

Staff

David Goldston

David Goldston served as Chief of Staff of the House Committee on Science from 2001 through 2006, the culmination of more than 20 years on Capitol Hill working primarily on science policy and environmental policy. Since retiring from the Congressional staff, Goldston has been a Visiting Lecturer at Princeton University's Woodrow Wilson School of Public and International Affairs and at the Harvard University Center for the Environment. He writes a monthly column for *Nature* on science policy titled "Party of One." He serves on the National Academy of Sciences' Aeronautics and Space Engineering Board and on a panel of the Academy's Committee on National Statistics. He Co-chaired an American Physical Society study on energy efficiency and has served on panels producing reports under the auspices of the American Academy of Arts and Sciences and OMB Watch.

Josh Trapani

Josh Trapani joined the staff of the Bipartisan Policy Center in 2008. Previously, he was an American Association for the Advancement of Science (AAAS) Science & Technology Policy Fellow on the Policy Analysis staff within the Research & Development Deputy Area, U.S. Forest Service, where his work focused on climate change adaptation and mitigation. Prior to that, Dr. Trapani was the American Geophysical Union's Congressional Fellow, working for Senator Dianne Feinstein (D-CA) on public lands, climate change, and other science issues. Dr. Trapani also holds a Research Collaborator position with the Department of Paleobiology at the Smithsonian Institution. Trained as a geoscientist, his research took him to sites throughout the United States as well as to Coahuila, Mexico and the Omo Valley of Ethiopia. He has published a dozen peer-reviewed papers, as well as essays on science and policy.