2010 Annual Report

NATIONAL ACADEMY OF ENGINEERING

ENGINEERING THE FUTURE

NATIONAL ACADEMY OF ENGINEERING
OF THE NATIONAL ACADEMIES

Letter from the President

Charles M.Vest

Technology today affects the lives of people in all economic conditions in all corners of the globe. It is conceived, developed, and produced worldwide, bringing hope and prosperity, but also complexity and risk. Global challenges, such as clean water, food, health care, energy, climate change, and security, cannot be met by technology alone, but neither can they be met without it. In a forum at the NAE Annual Meeting in October 2010, a panel of experts explored the many facets of global technology and highlighted the opportunities and responsibilities of engineering leaders (see *www.tvworldwide.com/events/nae/101004/* and *www.nae.edu/Publications/Reports/37947.aspx*).

As citizens and engineers, NAE members are cautioned by the Academies' report, *Rising Above the Gathering Storm Revisited: Rapidly Approaching Category 5*, released in September, which concludes that "in spite of the efforts of . . .government and the private sector, the outlook for America to compete for quality jobs has . . . deteriorated over the past five years" (since issue of the original report, *Rising Above the Gathering Storm*). The critical underpinnings of a successful nation in today's global context are encapsulated in the recommendations: (1) increase America's talent pool by vastly improving K-12 education in science and mathematics; (2) sustain and strengthen the nation's traditional commitment to long-term basic research; (3) make the United States the most attractive place to study and conduct research so we can continue to develop, recruit, and retain the best and brightest students, scientists, and engineers from the United States and throughout the world; and (4) ensure that the United States is the premier place in the world to innovate, invest in downstream activities such as manufacturing and marketing, and create high-paying jobs based on innovation.

Engineering, education, science, and technology are clearly at the heart of what has to be done. Unless we invest vigorously in basic research, an economic downslide is assured. If we do invest vigorously, we have a chance to avoid it. If we look intelligently at our innovation system, we should be able to carve out job-producing space, especially at the high end. A basic finding of studies of economic development is that the more technologically trained and creative people come into contact with each other, the higher the probability of innovation. We need more U.S. engineers to lead U.S. companies and create the products, services and processes of the future. Despite the growing global headwinds, there are still benefits to locating companies and manufacturing facilities where smart and innovative engineers are. We need a country with more people dreaming about what is possible, where young people, especially, are inspired to imagine and help create a better world, in some cases by pursuing an engineering education.

On January 4, 2011, President Obama signed legislation reauthorizing the America COMPETES Act, which was based on the recommendations in *Rising Above the Gathering Storm*. Although major components of the recommended increases in the research budget were funded largely through the FY 2010 Stimulus Bill, we continue to face uncertain research funding and insufficient action to improve K-12 education.

The charter of the National Academies is to provide independent advice to the nation on matters of science and technology and, at the request of the U.S. Department of the

Interior, a National Academy of Engineering/National Research Council (NAE/NRC) committee was convened to examine the causes of the *Deepwater Horizon* mobile offshore drilling unit Macondo well blowout, explosion, fire, and oil spill that occurred on April 20, 2010, and to identify measures for preventing similar incidents in the future. The interim report, released in November, includes the committee's preliminary findings and observations on actions and decisions related to well design, cementing operations, well monitoring, and well control. The interim report also considers management, oversight, and the regulation of offshore operations.

To pursue our goal of improving the public's understanding of engineering, in October, NAE teamed with Walt Disney Studios to create an interactive exhibit at the USA Science & Engineering Festival Expo on the National Mall in Washington, DC. The hands-on exhibits blended themes from the motion picture *TRON: Legacy* with NAE's Grand Challenges for Engineering. To get a better understanding of how real and virtual worlds can be brought together, visitors tried 3-D scanning, performed brain surgery on a computer-generated replica of a real brain, and experienced a trip into the *TRON: Legacy* digital grid through a 3-D light-painting activity created especially for the Expo.

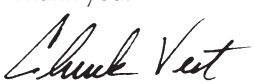
The NAE also continues to engage in activities that support our mission of expanding and enhancing relationships among engineering communities worldwide. In 2010, we continued our bilateral Frontiers of Engineering (FOE) programs with Germany, hosted by Oak Ridge National Lab, and India in Agra, India and held our first EU-US FOE program at Jesus College of Cambridge University, with the UK Royal Academy of Engineering as the lead European partner.

The NAE released a redesigned website at the 2010 Annual Meeting that enables use of more video, blogs, commenting, and other web 2.0 technologies (see *www.nae.edu*). The new design features large engaging photographs to spotlight news, projects, and current events. More content is available directly on the homepage, including a searchable membership directory. NAE members may login to view content that is for members only.

The independent programs of the NAE depend greatly on private philanthropy and we are extremely proud that our members believe those programs are worthy of their support. We are especially grateful to Joan and Irwin Jacobs who put forth a generous and successful matching gift challenge for the Class of 2010 to encourage annual donations to NAE for discretionary purposes. In the pages that follow, you will find lists of the members and friends whose generous contributions are helping NAE to continue making meaningful contributions to the well-being of the nation. We thank them for their support.

In this annual report, you will find additional details on the scope and depth of work undertaken by NAE in 2010. Our projects and reports have been conceived and executed to advance our goal of providing objective, independent advice to the federal government and the engineering community and proactively promote the technological welfare of the nation.

Thank you.



Charles M. Vest
President

In Service to the Nation

Every day our nation faces questions related to engineering and technology. How can we keep our nation safe from terrorism? How can we increase diversity in the engineering workforce? What role should citizens play in decisions about technology development? How can we help journalists and others in the media provide accurate, timely information on engineering and technology? As we advance technologically and become more involved in the global community, answering these questions becomes increasingly difficult.

Since 1964, the National Academy of Engineering (NAE) has provided independent, objective advice to the nation on engineering-related topics and policies. NAE operates under the same congressional act of incorporation that established the National Academy of Sciences, signed in 1863 by President Abraham Lincoln, to respond "whenever called upon by any department or agency of the government, to investigate, examine, experiment, and report upon any subject of science or art."

NAE has more than 2,404 peer-elected members and foreign associates, approximately 50 percent from academia, 42 percent from industry, and 8 percent from nonprofit institutions and government. NAE members are leaders in bioengineering, computer science, electronics, aerospace, earth resources, civil engineering, mechanical engineering, chemical engineering, industrial engineering, materials engineering, and interdisciplinary engineering. They serve as members of research and study committees, plan and conduct symposia and workshops, and assist in the work of the organization in many other ways. Activities include collaborative projects at home and abroad to identify and solve technological problems, assessments of the technological needs of the nation and sponsorship of programs to meet those needs, advising Congress and government agencies on engineering-related matters of national importance, and recognizing and honoring outstanding engineers for their contributions to the well-being of the nation and the world.

NAE not only responds to requests from government at the federal level, but also sponsors activities with foundations, industry, and state and local governments and funds projects through endowment funds supported by private contributions. Thus NAE is a unique organization that brings together distinguished engineers for the purpose of improving the lives of people everywhere.

NAE is a member of the National Academies, which also includes the National Academy of Sciences, Institute of Medicine, and National Research Council.

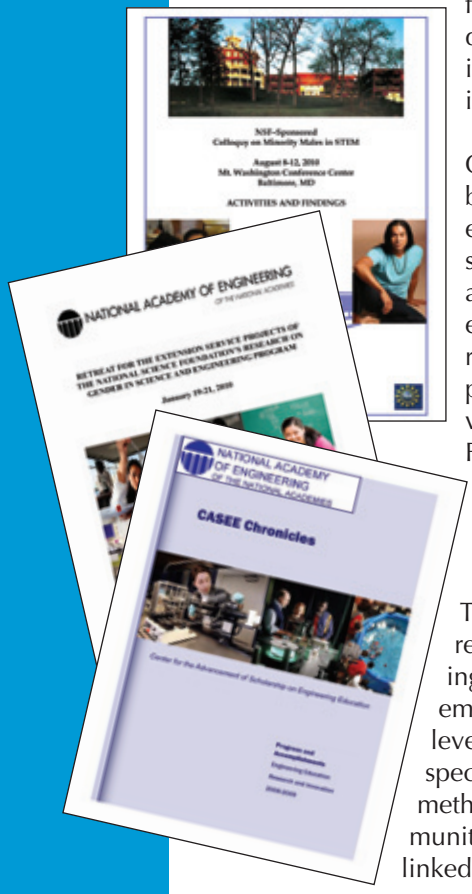
Mission Statement

To promote the technological welfare of the nation by marshalling the expertise and insights of eminent members of the engineering profession.

PROGRAM REPORTS

Center for the Advancement of Scholarship on Engineering Education

CASEE works collaboratively with a variety of institutions and organizations to leverage opportunities for improving engineering education. CASEE's activities during 2010 fell into three categories: (1) bringing together experts to define future directions in education research; (2) conducting original research to inform the decisions of policy makers and others; and (3) disseminating research findings to communities of engineering educators.



CASEE hosted two retreats in 2010. The first, held in January, brought together 40 representatives (principal investigators, key project staff, and evaluators) of projects developing a cadre of "extension service agents" to embed practices that have been proven effective at promoting the participation and success of women and girls in engineering. Such practices include innovations in pedagogy, curricular materials, support programs, and instructor development programs for K-12 school systems and individual colleges and universities. All of these projects are supported by the National Science Foundation (NSF) Research on Gender in Science and Engineering (GSE) Program. During the retreat, participants attempted to identify ways to make these projects more collaborative, more effective, and more interactive with communities of education researchers.

The second retreat, held in August 2010, brought together 44 researchers from universities to define a research agenda for increasing the participation and success of minority males in science, mathematics, engineering, and technology at the pre-college and college levels. The focus of the discussions was on (1) educational level and specific ethnic populations and (2) theoretical frameworks and research methodologies (e.g., data sufficiency). Attendees also discussed community building and advocacy activities to ensure that research would be linked to practice.

In fall 2010, CASEE received support to initiate, in collaboration with the American Society for Engineering Education, a pilot survey of approximately 35 institutions that grant associate degrees and 15 that grant baccalaureate degrees. The survey would include enrollment, degree attainment, and transfers by engineering and engineering technology students. The collected data will be used improve understanding and enhance the contributions of community colleges to the baccalaureate engineering population. The survey will be conducted in the second quarter of 2011.

Frontiers of Engineering Education

In December 2010, 53 of the nation's most innovative young engineering educators took part in the second Frontiers of Engineering Education (FOEE) symposium. For two-and-one-half days, these early-career faculty members, who are developing and implementing innovative educational approaches in a variety of engineering disciplines, shared ideas and learned from research on best practices in education. They returned with a charter to bring about improvements in their home institutions. The attendees, who were nominated by NAE members and engineering deans, were selected from a pool of highly qualified applicants. FOEE is sponsored by the O'Donnell Foundation. The first FOEE symposium was held in November 2009.

Our vision and mission for the FOEE Symposia and the outcomes we hope for them to achieve are as follows:

Vision: To strengthen the engineering and innovation capacity and capability of the nation, by catalyzing a vibrant community of *emerging* engineering education leaders.

Mission: Provide a symposium that recognizes accomplishment, facilitates learning, broadens collaboration, and promotes dissemination of pioneering practice in engineering education.

Participant Outcomes: Participants will strengthen their professional capacity for engineering education innovation by—

- Identifying and understanding how to apply identified **best practices** in engineering education;
- Developing new ideas to advance **their innovations** in engineering education;
- Developing an understanding that engineering educational innovation should be guided by the evolving evidence-based body of knowledge on **engineering learning**, in part established through research in engineering education;
- Establishing long-lasting **professional relationships** with those attending the symposiums, and through those relationships establish new or broadened networks with other educational innovators;
- Becoming **agents of change** to help advance the U.S. capacity for engineering education innovation

Broader Impact: The symposium will advance U.S. engineering education by—

- Enhancing the recruitment, retention, and professional success of engineering students by virtue of local and widespread implementations of FOEE innovations;
- Encouraging increased participation of (native born) U.S. students in careers in engineering;
- Raising the visibility and importance of nurturing the U.S. capacity for engineering education innovation, and raising the prominence of the young innovators in this domain;
- Facilitating the dissemination of the participants' educational innovations and strategies beyond the campus(es) of the participants;
- Stimulating new educational research and practices that advance the body of knowledge on engineering learning.

Technology Literacy

The purpose of the Program on Technological Literacy is to determine how Americans can become better prepared to navigate and participate actively in our technology-dependent society. What do adults and children need to know about technology? How involved should citizens be in deciding which technologies are developed and for what purposes? What changes in formal and informal education and in the policy arena will be necessary to prepare citizens to participate knowledgably in making these decisions?

The technological literacy program, now in its 12th year, has contributed to the development of standards for the study of technology in elementary and secondary schools; carried out a variety of outreach projects for educators, policy makers, and the general public; sponsored a number of informational workshops; and overseen a number of consensus studies.

Standards for K-12 Engineering

In 2010, NAE finished work on a project funded by the National Science Foundation (NSF) to assess the value and feasibility of developing content standards for K–12 engineering education. National standards have been adopted for science, mathematics, and technology education, among many other subjects, but not for engineering. The committee for this project, chaired by NAE member Robert M. White, Carnegie Mellon University (Emeritus), concluded that introducing stand-alone standards for pre-college engineering would not be advisable at this time. Instead, the committee argued that engineering content should be infused into new federal or state standards for mathematics and science and that engineering concepts and skills should be mapped to existing standards in these subjects. The study received additional support from the S.D. Bechtel, Jr. Foundation.

As the year closed, NAE received a large grant from the S.D. Bechtel, Jr. Foundation for a new study on the scope and potential of "integrated" STEM education. The project, which is also supported by the Samueli Foundation and PTC, Inc., will be conducted in collaboration with the NRC Board on Science Education.

Public Understanding of Engineering

Committee on Implementing Effective Messages

This committee, sometimes called the Changing the Conversation II committee, is charged with informing and energizing key segments of the engineering community about the potential for improving the public image of engineering. The project is a follow-up to the 2008 NAE report, *Changing the Conversation: Messages for Improving Public Understanding of Engineering*. In November, the CTC II project sponsored a stakeholders' workshop that engaged high-ranking individuals from industry, engineer-

ing education, government, and the non-profit sector. The workshop included presentations by organizations that are using the messages from the 2008 report and a preview of the new online "toolkit," *www.engineeringmessages.org*. Funded by NSF, the next phase of this project will focus on creating and disseminating an "action plan" for the adoption and use of the online toolkit and for encouraging coordinated outreach to the public by the larger engineering community. The project is co-chaired by NAE President Charles M. Vest and Ellen Kullman, Chair of the Board and CEO of DuPont.

Media Relations

In 2010, the NAE media relations office responded to inquiries from journalists around the world and actively "pitched" NAE-related stories and other engineering-related topics. The Deepwater Horizon oil spill in the Gulf of Mexico was of particular interest to the media in 2010. Immediately after the disaster, NAE communications staff served as a liaison between news organizations and NAE members to provide journalists with access to expert information. The media relations office has remained engaged in the story as NAE—in collaboration with the National Research Council—conducts an analysis of the disaster at the request of the U.S. Department of the Interior.

The NAE media relations office continued brainstorming meetings with television producer Anthony Zuiker, creator of the *CSI* franchise, about the possibility of a TV show based on bio-inspired engineering.

NAE Senior Media Relations Officer Randy Atkins continued to create weekly reports featuring engineering innovations on WTOP-FM (which has an all-news format and is the most listened-to radio station in the Washington, D.C. region) and Federal News Radio. NAE also features these reports on its website, *www.nae.edu/radio*, which has not only taken on a new look, but has also made it easier to access the audio. Podcasts of the radio stories are available for free to millions of subscribers via iTunes.

A "News & Terrorism: Communicating in a Crisis" workshop was held in St. Louis in January. This was the 18th workshop in a series produced in collaboration with the Radio and Television Digital News Foundation and the U.S. Department of Homeland Security (DHS). The workshops bring together journalists, public officials, technical experts, and private-sector representatives for "tabletop" scenario exercises of hypothetical terrorist attacks, customized for the host city. Former CNN anchor Aaron Brown was the moderator. With 125 participants, the St. Louis workshop was one of the most heavily attended in the series. The workshop scenarios reveal the challenges the media has in obtaining and communicating complex, time-critical information under stressful circumstances. Feedback based on post-workshop surveys has been overwhelmingly positive. NAE is currently writing a white paper on outcomes of the workshop series to date.

Public Relations

NAE conducted a major public outreach event in 2010. For the U.S. Science and Engineering Festival Expo, which was held on the National Mall in Washington, D.C., on October 23-24, NAE teamed with Walt Disney Studios to transport guests into the cyber-world of the major motion picture *TRON: Legacy* and, in addition, introduce them to the NAE

Grand Challenges for Engineering (see section below). The exhibit, a walk-through experience in a portion of the large National Academies' tent, revealed the creativity and world-changing power of engineers and engineering using life-sized props from the movie, the movie trailer and a feature that allowed individuals to craft a 3-D image of themselves in a "light painting" attraction created by Disney Imagineering exclusively for the NAE exhibit. With middle-school-aged children in mind—but engaging to the entire family—visitors were also treated to a visually stunning, hands-on, imaginative experience that included 3-D digital scanning and an opportunity to perform virtual-reality brain surgery. NAE also organized stage presentations for the Expo, including: a Disney Imagineer who described the "Top 10 Reasons You Might Be an Engineer"; an introduction to Watson, IBM's *Jeopardy*-playing supercomputer; a presentation of motion-capture technology that gave visitors a window into the magic world of film-making; and an interview of Vint Cerf, Draper Prize winner, NAE member, and a "father of the internet."

Throughout the year, the "Spotlight on Engineering" e-newsletter provided information on engineering and policy activities of the National Academies, engineering news from around the world, special events, and other items of interest to more than 6,000 subscribers.

Grand Challenges for Engineering

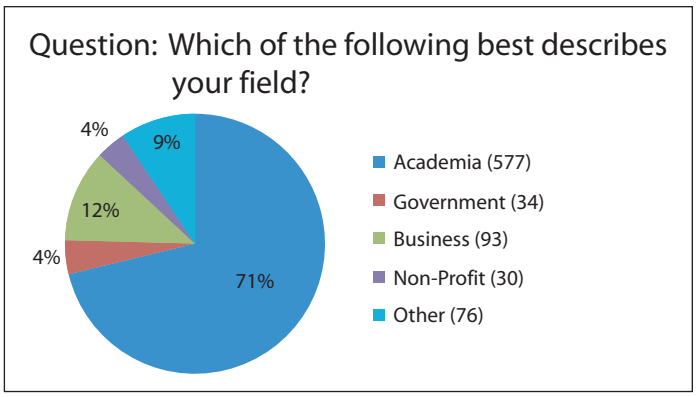
In 2008, the NAE Grand Challenges for Engineering—14 "game-changing" goals proposed by an international committee of leading thinkers and doers—were announced.

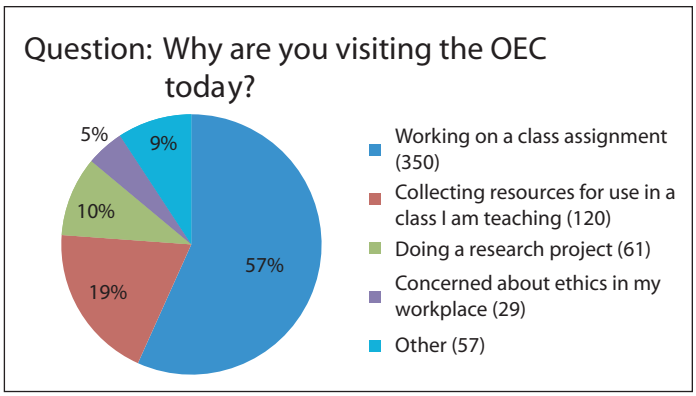
Since then, the project has continued to build momentum. In 2010, five regional summits were held in Boston, Chicago, Phoenix, Raleigh, and Seattle, and a national summit was held in Los Angeles in October. The summits brought together engineers, scientists, thought leaders, educators, corporate leaders, and policy makers, among others, to discuss the NAE Grand Challenges in various thematic contexts. The Grand Challenge Scholars Program, a combined curricular and extra-curricular program with five components designed to prepare students to address the Grand Challenges, has been adopted by dozens of colleges and universities. A K-12 Partners Program that encourages awareness of the Grand Challenges among younger students is also being developed. The NAE Grand Challenges have inspired numerous contests (video, essay, etc.), and the White House has included the Grand Challenges in its "Science and Technology Priorities for the FY 2012 Budget." Finally, NAE has assembled an expert advisory committee to help guide future activities. More on the project is available at *www.engineeringchallenges.org*.

Center for Engineering, Ethics, and Society

The Center for Engineering, Ethics, and Society (CEES) organized two events in 2010 to highlight the results of "Ethics Education in Science and Engineering", a National Science Foundation (NSF)-funded workshop held in 2008. One of these events was a workshop at the annual meeting of the American Association for the Advancement of Science in February. The second was a panel at the annual meeting of the American

Society for Engineering Education in June. In addition, CEES organized a mini-conference at the annual meeting of the Association for Practical and Professional Ethics in March based on findings of another 2008 workshop, "Engineering toward a More Just and Sustainable World". Summaries of both 2008 workshops have been published by The National Academies Press.





In 2010, CEES received two new NSF grants for projects on ethics and energy-related issues. The Climate Change Educational Partnership grant ("Climate Change, Engineered Systems, and Society") supports a collaborative project by NAE, Arizona State University (ASU), Colorado School of Mines, University of Virginia-Charlottesville, and the Boston Museum of Science to address technical and normative challenges to engineered systems posed by climate change. The goal is to establish a network of institutions that will develop materials and resources for high quality educational programs on the K–12 and undergraduate levels related to the science of climate change and its impact, especially on engineered systems.

The second NSF grant, "Energy Ethics in Science and Engineering Education," is a three-year collaborative project with Arizona State University to (1) develop and implement training activities related to energy and energy research ethics for interdisciplinary programs at ASU; (2) engage 15 graduate students from energy research programs around the nation in a week-long National Institute to prepare them for leadership in the field of energy ethics and energy ethics education; and (3) hold a workshop to raise awareness of the need to expand ethics education in energy-related fields.

CEES continues to sponsor the Online Ethics Center (OEC) at *www.onlineethics.org*, a highly ranked web-based resource for academic and practicing engineers and others working to improve engineering ethics and engineering ethics education. The pie charts show users and uses for the site. In 2010, the University of Illinois-Urbana received funding from the National Science Foundation to create the National Center for Professional and Research Ethics, a national on-line resource for science and engineering. As part of it, CEES/OEC will sponsor two workshops and reports, and materials and content for OEC will be expanded and enhanced.

The CEES and OEC advisory groups each met once in 2010 to suggest projects and contribute to their development. CEES Advisory Group members were instrumental in developing the energy-related projects described above. The OEC Advisory Group focused attention on the format and usability of OEC and the inclusion and development of new materials for the site.

Diversity in the Engineering Workforce

Engineer Girl! Website

The Engineer Girl! website, *www.engineergirl.org*, a significant component of NAE's web presence, has more than 20,000 visitors per month and is the number one listing on Google for "girls and engineering." The site is a general reference for young women considering careers in engineering, a field in which they have been, and continue to be, underrepresented. *Engineer Girl!* provides career guidance for students and parents, links to other sites, games, and interesting facts about engineering and the history of women in engineering. Portions of the site have been translated into Spanish to meet the needs of the Latino community.

The most popular feature, "Ask an Engineer," invites students to e-mail questions directly to any of the almost 200 practicing women engineers profiled on the site, who answer these questions directly. Most questions are about prerequisites for studying engineering, potential careers in engineering, and undergraduate engineering programs.

The subject of the 2010 *Engineer Girl!* annual essay contest was a survival design challenge. Students in grades 3 through 12 were asked to imagine that they had become lost during a field trip to a national forest and describe how they would use their clothing or accessories, the contents of their backpacks, and items in the environment to create a shelter, gather food and water, or attract the attention of a rescue party. More than 800 students submitted essays. As always, the winning essays were posted on the website.

The results of a survey conducted in 2009 confirmed that the website is reaching its target audience of young women. Fifty-eight percent of high school girls and 69 percent of middle school girls who had visited the site said they were likely to visit again, and many said they had shared information about the website with others (54 percent of high school girls and 69 percent of middle school girls).

Engineer Your Life Project

The Engineer Your Life (EYL) Project is a national initiative that encourages college-bound high-school girls to consider pursuing undergraduate degrees in engineering. Project participants, in addition to NAE, include the American Association of Engineering Societies, the American Society of Civil Engineers, WGBH Foundation,

and several other engineering associations. NAE hosts and maintains the website, *www.engineeryourlife.org*, which provides resources for students, teachers, guidance counselors, and engineers about careers in engineering. The site features profiles of young women engineers and highlights the contributions of engineering and technology in addressing the difficult challenges facing our planet.

An independent evaluation in 2009 found that EYL has stimulated interest in engineering (79 percent of girls familiar with EYL listed engineering as their number one career choice) and inspired girls (75 percent who were familiar with EYL said the website had made them want to take an engineering class). Overall, the evaluation found that EYL is helping girls understand the requirements and rewards of pursuing engineering degrees and the variety of interesting jobs available to engineers.

Frontiers of Engineering

Frontiers of Engineering (FOE) is a symposium series that brings together emerging engineering leaders from industry, academe, and government laboratories to discuss pioneering technical work and leading-edge research in various fields of engineering and industrial sectors. The goals of the symposia are: (1) to introduce outstanding young engineers (ages 30-45) to each other to encourage contacts among the next generation of engineering leaders and (2) to facilitate collaborations and the transfer of techniques and approaches across engineering fields to sustain and build U.S. innovative capacity.

The annual U.S. Frontiers of Engineering (US FOE) Symposium brings together approximately 100 engineers from across the country. FOE also has five bilateral programs: (1) German-American Frontiers of Engineering (GAFOE), in partnership with the Alexander von Humboldt Foundation; (2) Japan-America Frontiers of Engineering (JAFOE), in partnership with the Engineering Academy of Japan; (3) Indo-American Frontiers of Engineering (IAFOE), in partnership with the Indo-U.S. Science and Technology Forum; (4) China-America Frontiers of Engineering (CAFOE) in partnership with the Chinese Academy of Engineering, and (5) E.U.-U.S. Frontiers of Engineering (EU-US FOE) in partnership with the European Council of Applied Sciences and Engineering. Each bilateral symposium is attended by approximately 30 engineers from the partner country and 30 from the United States.

Four symposia were held in 2010. In March, the IAFOE Symposium was held in Agra, India. The topics were health diagnostics and disease monitoring technologies, high-performance computing, advanced engineering materials, and technologies for a clean environment and environmental cleanup. In April, the GAFOE Symposium was hosted by Oak Ridge National Laboratory in Oak Ridge, Tennessee. The topics were lasers: the final frontier, rapid vaccine manufacturing, modern power system grid control, and novel concepts for automobiles. The inaugural EU-US FOE was held at Jesus College, Cambridge University in Cambridge, U.K. in early September with

the local organization provided by the Royal Academy of Engineering of the UK. The topics were bio-inspired engineering, signal processing, augmented reality, and materials ecology. Later that month, the US FOE Symposium was hosted by IBM in Armonk, New York. The topics were cloud computing, engineering and music, autonomous aerospace systems, and engineering inspired by biology.

FOE encourages continued interaction among participants in FOE symposia through ongoing outreach activities. Yearly proceedings, such as *Frontiers of Engineering: Reports on Leading Edge Engineering from the 2009 NAE Symposium on Frontiers of Engineering,* which was published in February 2010, are mailed to past U.S. FOE participants. A generous grant from The Grainger Foundation in 2008 enabled the implementation of a new content-management database and redesign of the FOE website, which were completed in 2010. In addition to the traditional features of a searchable database and directory of all FOE alumni, the new website includes an FOE Alumni News section where alumni can share information, an FOE Alumni Spotlight that focuses on FOE participants' research and technical work, and more content from the FOE meetings. In addition, the Alexander von Humboldt Foundation and the Indo-U.S. Science and Technology Forum provide support for ongoing collaborations among participants in the GAFOE and IAFOE symposia, respectively.

Armstrong Endowment for Young Engineers – Gilbreth Lectures

The Armstrong Endowment for Young Engineers–Gilbreth Lectures, a related but independent program, selects outstanding engineers from among FOE speakers to give presentations at the NAE Annual and National Meetings.

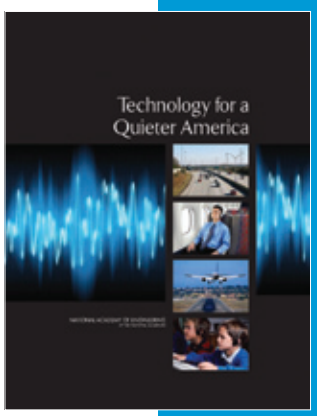
In February 2010, four speakers delivered Gilbreth lectures at the National Meeting in Washington DC. Dr. Ayanna Howard, associate professor of electrical and computer engineering at the Georgia Institute of Technology, spoke on "Robot Learning: Humanized Intelligence for Space and Field Robotics." Dr. Laura Niklason, professor of anesthesiology and biomedical engineering at Yale University, spoke on "Engineering Human Arteries–Off-the-Shelf Biomaterials." Dr. Jorge Lopez, project leader for areal monitoring at Shell International Exploration and Production Inc., spoke on "Reservoir Imaging in Exploration and Exploitation." And, Dr. Chad Jenkins, assistant professor of computer science at Brown University, spoke on "Learning the Foundations for Humanoid Autonomy."

Two speakers delivered Gilbreth lectures at the Annual Meeting in October 2010. Dr. J.-Y. Christine Chiu, lecturer in the Department of Meteorology at the University of Reading, U.K., spoke on "Climate Observation from the Atmospheric Radiation Measurement (ARM) Program." Dr. David L. Sedlak, professor of civil and environmental engineering at the University of California, Berkeley, spoke on "Reinventing Urban Water Systems."

Technology for a Quieter America

Exposure to noise at home, at work, while traveling, and during leisure activities is a fact of life for all Americans. Sometimes noise is loud enough to damage hearing. At lower levels, it can disrupt normal living, affect sleep patterns and concentration at work, interfere with outdoor recreational activities, and, in some cases, interfere with communication and even cause accidents. Clearly, exposure to excessive noise can affect our quality of life.

As the population of the United States and the world increases and developing countries become more industrialized, noise is likely to become more pervasive and affect the quality of life for people everywhere. Attempts to manage noise exposures, to design quieter buildings, products, equipment, and vehicles, and to provide a regulatory environment that ensures cost-effective, sustainable noise control require immediate attention and action.



In September 2010, NAE published *Technology for a Quieter America*, the final report of a multi-year study. The report includes a review of state-of-the-art noise-control engineering, assessments of the technological, economic, and political climate for implementing noise control, and descriptions of gaps in research. Authored by a 14-member committee of experts and chaired by NAE member George Maling of the Institute for Noise Control Engineering USA, the report covers the most commonly identified sources of noise, explains how they are characterized, and describes efforts to reduce noise emissions and exposure. In addition, the report includes discussions of standards and regulations that govern noise levels, federal, state, and local agencies that regulate noise for the benefit, safety, and wellness of society at large, and cost-benefit trade-offs between efforts to mitigate noise and the improvements they achieve. Finally, the report provides information about sources available to the public on the dimensions of noise problems and their mitigation and an argument for educating more professional noise-control engineers who are trained to deal with these issues.

The study committee's recommendations include: (1) undertaking cost-benefit analyses of noise-reduction measures, especially for traffic noise; (2) supporting the development of technologies that reduce airplane noise; (3) improving metrics for establishing noise levels as a basis for noise controls; (4) lowering limits for noise exposure in industrial settings; (5) initiating buy-quiet programs for consumers; (6) adopting international standards for noise emissions; and (7) controlling noise levels in schools, hospitals, office buildings, and other structures. The committee also recommends more cooperation between industry and relevant government agencies and a larger role for the Environmental Protection Agency, which is already empowered in existing law.

Technology, Science, and Peacebuilding

Violent conflicts cause suffering and destabilization throughout the world. At least 100 nascent, active, or post-conflict situations are being monitored across the globe, and hundreds of thousand of people die every year as a direct or indirect result of these conflicts. Many more suffer life-changing physical or mental disabilities, and large numbers of people are displaced from their homes. In addition to these human costs, economic and social costs include damage to infrastructure, loss of agricultural capacity, lost worker productivity, and devastated social institutions.

In 2007, NAE, in partnership with the United States Institute of Peace (USIP), convened a workshop to explore how information and communication technology (ICT) might be used to help prevent and manage violent conflicts. In March 2009, NAE and USIP convened a follow-up one-day brainstorming session to discuss options for supporting ongoing multi-stakeholder dialogue and action on technology and peacebuilding. Co-chaired by NAE President Charles M. Vest and USIP President Richard Solomon, the 15-member planning group, which included seven NAE members and other experts in science, health, and peacebuilding, concluded that a joint National Academies-USIP roundtable on technology, science, and peacebuilding should be established.

Based on guidance from participants in the March 2009 planning meeting, NAE and USIP developed a three-year proposal for a roundtable that would provide a forum for stakeholder groups (government, industry, academia, and non-governmental organizations [NGOs]) to (1) consider how using technology and engineering and scientific methods might contribute to conflict prevention, peacemaking, and peacekeeping and (2) explore opportunities for ongoing collaboration among stakeholders to address key issues.

Throughout 2010, NAE and USIP officers and staff shared the proposal with prospective roundtable member organizations, including several federal agencies, global technology-intensive corporations, multilateral organizations and NGOs, and academic research centers/programs. By the end of the year, 13 organizations, in addition to the National Academies and USIP, had confirmed their membership in the roundtable (including the U.S. Departments of State and Defense, U.S. Agency for International Development, National Science Foundation, Qualcomm Inc., CRDF-Global, Interaction, Search for Common Ground, International Crisis Group, Engineers Without Borders, and International Center for Nonviolent Conflict). The recruitment of leading academic experts from the engineering, science, and peacebuilding communities, as well as leaders of corporate, federal, and multilateral organizations, will continue during the first half of 2011.

Analysis of Causes of the *Deepwater Horizon* Explosion

In response to a request from the Secretary of the U.S. Department of the Interior in June 2010, NAE and the National Research Council (NRC) formed a

committee to examine the causes of the *Deepwater Horizon* oil rig – Macondo well blowout, explosion, fire, and oil spill that occurred on April 20, 2010, and to identify ways to prevent similar incidents in the future. The 15-member study committee, chaired by NAE member Donald Winter, former secretary of the Navy, includes NAE members and other qualified practitioners and academicians with expertise in geophysics, petroleum engineering, marine systems, accident and incident investigations, safety systems, risk analysis, human factors, and organizational behavior.

The ongoing study is addressing the performance of technologies and practices that were implicated in the probable causes of the *Deepwater Horizon* incident. The committee will identify and recommend available technology, industry best practices, best available standards, and measures in use around the world in deepwater exploratory drilling and well completion that could help prevent future accidents of this kind. The scope of the study does not include issues associated with fire and rescue responses, spill cleanup, or the effects of the oil spill on the environment and human health.

In November 2010, NAE and NRC released the *Interim Report of the Committee on the Analysis of Causes of the Deepwater Horizon Explosion, Fire, and Oil Spill to Identify Measures to Prevent Similar Accidents in the Future*. This report includes the committee's preliminary findings and observations on various actions and decisions related to well design, cementing operations, well monitoring, and well control actions. The interim report also addresses issues related to the management, oversight, and regulation of offshore operations. The final report is expected to be released in September 2011.

Engineering and Health

In October 2009, NAE President Charles Vest and IOM President Harvey Fineberg tasked a small group of NAE and IOM members, co-chaired by NAE member William Rouse of Georgia Institute of Technology and IOM member Denis Cortese of the Mayo Clinic, with exploring ideas for collaboration between IOM and NAE at the intersection of engineering and health. This informal advisory group proposed two complementary initiatives for future efforts: (1) activities that would accelerate the adoption of systems engineering tools and methods throughout the U.S. health care system; and (2) activities that would leverage opportunities at the intersection of engineering and biomedicine. Both concepts were presented by Drs. Cortese and Rouse and fellow advisory group member and NAE member, Rebecca Bergman of Medtronic, at the first-ever joint meeting of the NAE and IOM Councils on May 9, 2010. The proposed initiatives were subsequently debated, refined, and approved at the summer 2010 meetings of both councils.

To advance the first initiative, in October 2010, the NAE and IOM presidents tasked a small steering committee, co-chaired by IOM member Bill Stead of Vanderbilt University Health System and NAE member Bill Rouse, with developing "version 0 of an 'architect's model' of an engineered system of care" that would help health professionals, engineers, policy makers, and the broader public understand the potential of using systems engineering methods and tools to advance the goals of a patient-centered, value-driven, learning health system.

In December, at the first of three planned meetings, the nine-member steering committee of NAE and IOM members began work on a case statement and strategic road map for a multi-year "National Academies Healthy America Initiative." The steering committee plans to present the statement and road map at the IOM and NAE Council meetings in spring 2011.

To advance the second initiative, IOM and NAE developed a proposal for a joint Forum on Engineering and Bio-Medicine to explore interdisciplinary problems. Focused initially on medical devices, diagnostics, and combination products, the forum would bring together stakeholders from government, industry, academia, and other sectors for an ongoing dialogue on issues of mutual interest. IOM and NAE will seek support for the forum in 2011.

The Emerging Field of Synthetic Biology: Six Academy Dialogues

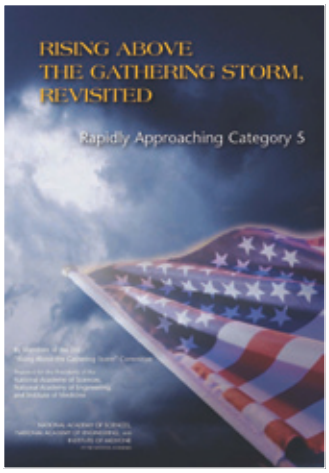
At a planning meeting in London in June 2010, representatives of NAE and NAS, the Royal Society, the Royal Academy of Engineering, the Chinese Academy of Sciences, and the Chinese Academy of Engineering agreed to hold a series of three international symposia to (1) explore national and regional differences in research, innovation, and commercialization in synthetic biology and the policies (ethical, regulatory, security, biosafety, intellectual property, and others) that shape them and (2) assess the implications of the differences for how the field will develop nationally and internationally in the future. Synthetic biology is viewed by the NAE as an engineering endeavor as much as a scientific endeavor.

The first symposium, planned for April 2011 in the UK, will provide an overview of synthetic biology and a review of developments in the past 5 years; an estimate of what might be achieved in the next 5, 10, and 25 year periods; the requirements and resources necessary for realizing value creation from synthetic biology; and the necessary conditions for an enabling environment. The focus of the second symposium, tentatively planned for fall 2011 in China, will be on the scientific and technical challenges that must be met to enable further development of the field. The third symposium, tentatively planned for winter 2011 in the United States, will focus on next-generation tools, platforms, and infrastructure for continued progress in synthetic biology and associated policy implications.

Support for the National Academies' participation in the planning and execution of the six-academy symposium series is being provided by the Alfred P. Sloan Foundation.

The Gathering Storm, Revisited: Rapidly Approaching Category 5

Although the United States leads the world in science and technology development and the U.S. economy is based largely on scientific and technological innovation, danger signs on the horizon suggest that U.S. leadership in these areas is threatened.



For example, U.S. students consistently score below the international average in math and science, and, for the cost of hiring an engineer in the United States, a company can hire eight young professional engineers in India. These and other factors suggest that America's advantages are eroding.

This was the overarching conclusion in the National Academies' landmark report, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, released in 2005, authored by a committee chaired by NAE member Norman Augustine, retired CEO of Lockheed Martin, and including Nobel laureates and prominent business, government, and academic leaders, nine of them NAE members. The committee issued a strong warning that the United States was losing its global competitive edge in research and technology and that, unless concrete steps were taken to reverse that trend, U.S. prosperity would decline.

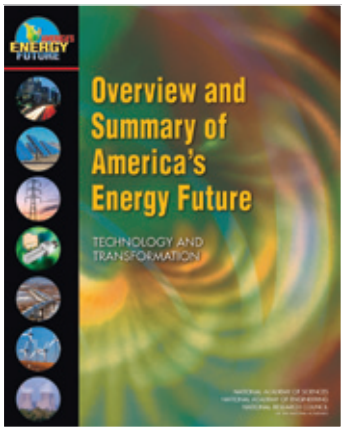
The committee made four recommendations with 20 specific implementation actions for improving K–12 science, technology, engineering, and math (STEM) education, attracting the best and brightest students to STEM higher education, increasing support for research, and improving the environment for innovation and the America COMPETES Act, which was signed into law in 2007, included almost all of them.

During 2010, *Gathering Storm* was again a central focus for debates on science and technology policy. At the request of the presidents of the National Academy of Engineering, National Academy of Sciences, and Institute of Medicine, available members of the original study committee prepared a follow-up report, *Gathering Storm, Revisited: Rapidly Approaching Category 5*. The new report provides a succinct review of actions taken in response to the original study and an analysis of subsequent changes, accompanied by supportive factoids and quotes. Unfortunately, as suggested by the title, the committee concluded that conditions have actually deteriorated since the first report was released.

Released in September 2010, *Gathering Storm, Revisited* was a focus of congressional and national media attention through the first months of 2011, and the America COMPETES Act was reauthorized by Congress in December 2010 and signed by President Obama in January 2011.

America's Energy Future: Technology Opportunities, Risks and Tradeoffs

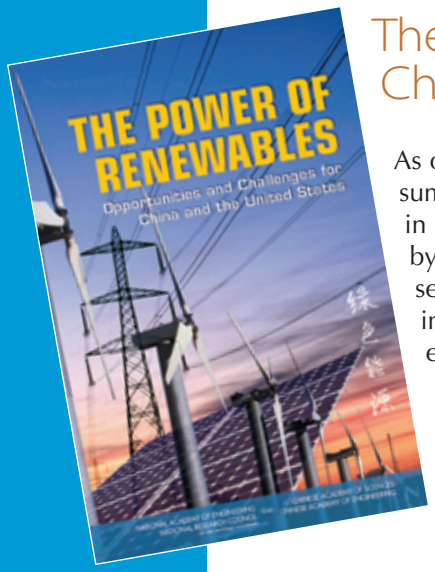
In 2009, several panel reports associated with America's Energy Future: Technology Opportunities, Risks and Tradeoffs (a joint NAE-NAS project) were delivered to the administration and Congress and subsequently released publicly. In 2010, the National Academies released four final documents—two more panel reports,



Real Prospects for Energy Efficiency in the United States and *Electricity from Renewable Resources*; a detailed, in-depth report based on all of the panel reports and studies, *America's Energy Future: Technology and Transformation*; and *Overview and Summary of America's Energy Future: Technology and Transformation*, a summary report highlighting key findings and major topics in the full report.

Initiated in 2007, the purpose of the AEF project was to inform a national dialogue on the nation's energy future. Taken together, the reports provide authoritative characterizations of technologies that are either currently available or could be available in the next two decades to help meet energy challenges. Since their publication, they have been the subject of scores of briefings and were widely disseminated among policy makers (see *www.nationalacademies.org/energy*). The recommendations also figured prominently in considerations by Congress of energy and climate legislation in 2010 and by government departments and agencies still considering options for energy research and development (including the newly established *Quadrennial Technology Review*, initiated in early 2011 by the U.S. Department of Energy.

As a whole, the AEF reports make a strong case that, with sustained, national, long-term commitment, the United States could realize substantial improvements in energy efficiency, new sources of energy, and reductions in greenhouse gas emissions through the accelerated deployment of the existing and emerging technologies in this portfolio. However, this will require mobilization of the public and private sectors and long-term policies and investment. Actions taken between now and 2020 to develop and demonstrate key technologies will largely determine our options for many decades to come. Therefore, work on key technology development and demonstration should begin very soon, even though some will be expensive, some will not be successful, and some are likely to be overtaken by better and newer technologies.



The Power of Renewables: Opportunities and Challenges for China and the United States

As of 2010, the United States and China are the world's top two energy consumers and two largest economies. Consequently, they are decisive players in a clean energy future for the world. Both countries are also motivated by related goals, namely diversified energy portfolios, job creation, energy security, and pollution reduction, making renewable energy development an important strategy with wide-ranging implications. Given the size of their energy markets, substantial progress by these two countries in advancing the use of renewable energy will provide global benefits in terms of enhanced technological understanding, reduced costs through expanded deployment, and reduced greenhouse gas (GHG) emissions relative to conventional generation from fossil fuels.

In this context, the National Academies, in collaboration with the Chinese Academy of Sciences (CAS) and Chinese Academy of Engineering (CAE), initiated a study in late 2008, chaired on the U.S. side by NAE member Larry Papay, to review renewable energy development and deployment in the two countries, to highlight prospects for collaboration, from research to deployment, and to recommend strategies to accelerate the economical attainment of renewable energy goals.

The committees' final report, published by National Academies Press in November 2010, focuses on six main areas:

Resource Assessment. A reassessment of China's wind resources using higher resolution wind resource data and higher turbine hub heights could help to identify new wind development sites. The committees recommended collaboration on integrated resource planning and scenario modeling, combining multi-resource maps (e.g., wind, solar, biomass), economic supply curves, and geospatial information (e.g., existing transmission, water supplies), to identify opportunities to reduce implementation costs.

Technology Development. Concentrating solar power (CSP) is at an early stage of development in China but is a potentially suitable technology for some of its planned large-scale solar energy bases. The committees concluded that both countries will have to transform their power delivery systems to accommodate and integrate large amounts of variable-output renewable electric power and that they can collaborate on the technical challenges to modernizing their respective power grids.

Environmental Impacts. Both the United States and China would benefit from efforts to improve the cost effectiveness and efficiency of low water-use cooling systems, which will be important to the deployment of CSP, biopower, and all thermoelectric generating technologies. The committees also recommended cooperation on waste reduction from polysilicon production (an input to many solar photovoltaic [PV] products) and the recycling of PV panels and wind turbine blades.

Policy and Deployment. China's renewable energy policies have given a clear and consistent signal to its domestic market for renewable power, whereas the United States has relied on inconsistent state-level standards for renewables and select national incentives (e.g., production tax credits) to stimulate a renewable power market. The committees recommended that, as these markets expand and mature, China and the United States collaborate on developing technical standards and certification mechanisms for renewable power technologies.

Sustainable Energy Systems. As the United States and China endeavor to integrate cleaner power generation technologies, a number of opportunities will arise for cooperation on "enablers" (e.g., plug-in electric vehicles) beyond the generation technologies per se. Moreover, both countries will have to increase clean energy R&D dramatically to support transformation of their energy structures.

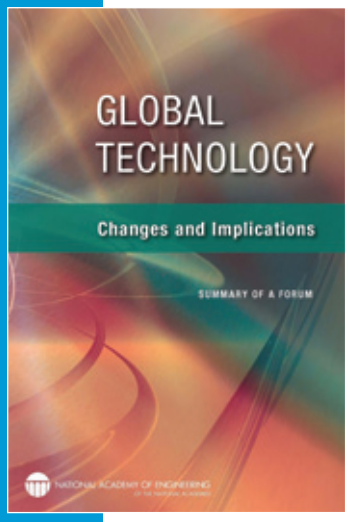
Cooperation Frameworks. The committees concluded that U.S. and Chinese government cooperation should focus on more sub-national (e.g., state-province, utility-utility) bilateral cooperation. Personnel exchange programs, regional partnerships, and academic collaborations would all help advance organizational learning in renewable power development and grid integration.

The report was funded by the U.S. Department of Energy, the U.S. Department of State, Google.org, the National Academy of Engineering, the National Research Council, the National Science Foundation, the Chinese Academy of Sciences, and the Chinese Academy of Engineering.

Global Technology: Changes and Implications

On October 4, 2010, as part of the NAE annual meeting, a panel of seven experts from a variety of disciplines and economic sectors participated in a three-hour forum, Global Technology: Changes and Implications, to explore the effects, complexities, and risks associated with the global spread of technology and the opportunities and responsibilities this phenomenon entails for engineering leaders.

Participants included Esko Aho, former prime minister of Finland and currently executive vice president of corporate relations and responsibility at Nokia, Bernard Amadei, professor of civil engineering at the University of Colorado and founder of Engineers Without Borders-USA and the Engineers Without Borders-International network, John Seely Brown, visiting scholar and advisor to the provost at the University of Southern California and, for nearly two decades, director of the Xerox Corporation Palo Alto Research Center, Ruth David, president and chief executive officer of Analytic Services Inc., and former deputy director for science and technology at the Central Intelligence Agency, Eric Haseltine, a consultant in management and innovation and for many years a leader of Disney Imagineering, Nicholas Negroponte, co-founder of MIT's Media Lab and founder of the One Laptop per Child Foundation and Raymond Stata, cofounder and chairman of the board of Analog Devices, Inc., and a quintessential American technology-based entrepreneur. The panel was moderated by NAE president Charles M. Vest.



A summary of the insightful comments of these remarkable panelists and the ensuing discussions are included in the 2011 National Academies Press publication, *Global Technology: Changes and Implications—Summary of a Forum*.

2010 NAE AWARDS RECIPIENTS

Founders Award

The Founders Award is given in recognition of an NAE member or foreign associate who has exemplified the ideals and principles of NAE through professional, educational, and personal achievement and accomplishment. The award is presented at the NAE Annual Meeting and carries a $2,500 cash prize and a gold medal.

Robert Langer

Robert Langer "for the invention, development, and commercialization of methods and materials for drug delivery and tissue engineering, mentoring of young scientists, and the promotion of the nation's health."

Arthur M. Bueche Award

The Bueche Award honors an engineer who has been actively involved in advancing U.S. science and technology policy, promoting U.S. technological development, and enhancing relations between industry, government, and universities. The award is presented at the NAE Annual Meeting and carries a $2,500 cash prize and a gold medal.

Anita K. Jones "for leadership in the development of U.S. science and technology policy and the development of technologies for national security, including technical contributions to high performance computing and cybersecurity."

Anita K. Jones

For additional information about the NAE awards, please visit our website www.nae.edu/awards.

2010 NEW MEMBERS AND FOREIGN ASSOCIATES

In February, NAE elected 68 new members and nine foreign associates, bringing the total U.S. membership to 2,267 and the number of foreign associates to 196. Election to the National Academy of Engineering is among the highest professional distinctions accorded to an engineer. Academy membership honors those who have made outstanding contributions to "engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature," and to the "pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education."

A list of newly elected members and foreign associates follows, with their primary affiliations at the time of the Induction Ceremony, October 3, 2010.

NEW MEMBERS

Joseph A. Ahearn
CH2M Hill Ltd., retired; U.S. Air Force
Ilhan A. Aksay
Princeton University
Montgomery M. Alger
Air Products and Chemicals Inc.
Lisa Alvarez-Cohen
University of California, Berkeley
John D. Anderson, Jr.
Smithsonian Institution, retired
Daniel N. Baker
University of Colorado at Boulder
Cynthia Barnhart
Massachusetts Institute of Technology
Rebecca M. Bergman
Medtronic, Inc.
Jacobo Bielak
Carnegie Mellon University
Clyde L. Briant
Brown University
Andrei Z. Broder
Yahoo! Research
James W. Burns
Genzyme Corporation
Gang Chen
Massachusetts Institute of Technology
Brian Clark
Schlumberger Companies
Robert E. Cohen
Massachusetts Institute of Technology
John P. Connolly
Anchor QEA, LLC
Martin Cooper
Dyna, LLC
Michael T. Duke
Wal-Mart Stores Inc.
Heinz Erzberger
NASA Ames Research Center, retired
Richard C. Flagan
California Institute of Technology
Paul G. Gaffney, II
Monmouth University
Arthur Gelb
Four Sigma Corporation
Maryellen L. Giger
The University of Chicago
C. Randy Giles
Bell Labs Seoul Ltd., Alcatel-Lucent
Irene Greif
IBM Thomas J. Watson Research Center
William D. Gropp
University of Illinois at Urbana-Champaign
Laura M. Haas
IBM Almaden Research Center
Eugene E. Haller
University of California, Berkeley
Jeffrey A. Hubbell
École Polytechnique Fédérale de Lausanne
Michael R. Johnson
University of Arkansas
Michael I. Jordan
University of California, Berkeley
Brewster Kahle
Internet Archive
Eric W. Kaler
Stony Brook University
Abraham E. Karem
Karem Aircraft, Inc.
Jay D. Keasling
University of California, Berkeley
Jon Khachaturian
Versabar, Inc.
Thomas F. Kuech
University of Wisconsin-Madison

Derrick M. Kuzak
Ford Product Development Center
Einar V. Larsen
GE Energy
Hau L. Lee
Stanford University
Anthony Leonard
California Institute of Technology
Dennis P. Lettenmaier
University of Washington
Robert A. Lindeman
Northrop Grumman, retired
John O. Marsden
John O. Marsden, LLC
David A. Miller
Stanford University
Tom M. Mitchell
Carnegie Mellon University
David J. Mooney
Harvard University
David L. Morse
Corning Incorporated
Ali Mosleh
University of Maryland, College Park
William New, Jr.
The Novent Group
Paul D. Nielsen
U.S. Air Force, retired; Carnegie Mellon University
Gregory H. Olsen
GHO Ventures, LLC
Gregory B. Olson
Northwestern University
Thomas W. Parks
Cornell University, emeritus
Larry L. Peterson
Princeton University
Roderic I. Pettigrew
National Institute of Biomedical Imaging and Bioengineering
George F. Pinder
University of Vermont
Mark R. Pinto
Applied Materials
Stephen B. Pope
Cornell University
William R. Pulleyblank
IBM Global Business Services
Arthur H. Rosenfeld
Lawrence Berkeley National Laboratory
Richard Scherrer
Retired Consultant, Aircraft Design
Ben A. Shneiderman
University of Maryland, College Park
John C. Wall
Cummins, Inc.
Mark N. Wegman
IBM Thomas J. Watson Research Center
Andrew J. Whittle
Massachusetts Institute of Technology
Alan S. Willsky
Massachusetts Institute of Technology
Xiang Zhang
University of California, Berkeley

NEW FOREIGN ASSOCIATES

José M. Aguilera
Pontificia Universidad Católica de Chile, Chile
Edward J. Davison
University of Toronto, emeritus, Canada
L.K. Doraiswamy
Iowa State University, emeritus, India
Kenji Ishihara
Chuo University, Japan
Danie G. Krige
University of the Witwatersrand, emeritus, South Africa
Sang Yup Lee
KAIST (Korea Advanced Institute of Science and Technology), Republic of South Korea
N. R. N. Murthy
Infosys Technologies Ltd., India
Jens Nielsen
Chalmers Institute of Technology, Sweden
Jun-ichi Nishizawa
Sophia School Corporation, Japan

NAE ANNIVERSARY MEMBERS

45 YEARS OR MORE

Name in bold celebrated his 45th year in 2010.

Allen E. Puckett
Simon Ramo

40 TO 44 YEARS

Names in bold celebrated their 40th year in 2010.

Gene M. Amdahl
Neal R. Amundson
Edward J. Barlow
Robert F. Bauer
Leo L. Beranek
R. Byron Bird
Harold Brown
Arthur E. Bryson
Francis H. Clauser
Ray W. Clough
Karl P. Cohen
John P. Craven
Edward E. David, Jr.
Don U. Deere
Alexander H. Flax
Jay W. Forrester
John S. Foster, Jr.
Earnest F. Gloyna
Richard J. Grosh
Jerrier A. Haddad
William J. Hall
Woodrow E. Johnson
Charles H. Kaman
Christopher C. Kraft, Jr.
J. Ross Macdonald
John J. McKetta, Jr.
Brockway McMillan
George E. Mueller
Hilliard W. Paige
William J. Perry
Max S. Peters
Calvin F. Quate
Mark K. Smith
Louis D. Smullin
Dean A. Watkins
Edward Wenk, Jr.
Albert D. Wheelon
Robert M. White

35 TO 39 YEARS

Names in bold celebrated their 35th year in 2010.

William G. Agnew
Betsy Ancker-Johnson
Arthur G. Anderson
Wm. Howard Arnold
Rupert L. Atkin
Albert L. Babb
William F. Ballhaus, Sr.
Thomas D. Barrow
Jordan J. Baruch
Richard H. Battin
Stephen D. Bechtel, Jr.
Donald L. Bitzer
B. Paul Blasingame
Andrew H. Bobeck
Bruno A. Boley
Sidney A. Bowhill
Willard S. Boyle
Lewis M. Branscomb
P. L. Thibaut Brian
Norman H. Brooks
J. Fred Bucy
James R. Burnett
Robert H. Cannon, Jr.
Jack E. Cermak
Robert A. Charpie
Joseph V. Charyk
Stuart W. Churchill
Edward Cohen
Edgar M. Cortright
Malcolm R. Currie
George C. Dacey
Lee L. Davenport
Gerald P. Dinneen
Robert M. Drake, Jr.
Mildred S. Dresselhaus
Kenneth McK. Eldred
Charles H. Elmendorf, III*
Ersel A. Evans
James L. Everett, III
James R. Fair*
Robert M. Fano
A. J. Field
Morris E. Fine
Daniel J. Fink
Peter T. Flawn
Robert A. Frosch
Elmer L. Gaden
Joseph G. Gavin, Jr.*
Ivar Giaever
James F. Gibbons
Ralph E. Gomory
Roy W. Gould
Paul E. Gray
John C. Hancock
Thomas J. Hanratty
Cyril M. Harris
John P. Hirth
Nick Holonyak, Jr.
Arthur E. Humphrey
H. Richard Johnson
James R. Johnson
Ernest S. Kuh
T. William Lambe
Salomon Levy
John G. Linvill
C. Gordon Little
Robert G. Loewy
Alan M. Lovelace
John Lowe, III
Frank E. Marble
Fujio Matsuda
Gordon H. Millar
John L. Moll
Dale D. Myers
Joseph H. Newman
David Okrent
Robert J. Parks
Thomas L. Phillips
Robert Plunkett
David S. Potter
Eric H. Reichl
Leslie E. Robertson
Warren M. Rohsenow
Harold A. Rosen
Ian M. Ross
Rustum Roy*

**Deceased*

Anthony E. Siegman
John H. Sinfelt
Ivan E. Sutherland
Morris Tanenbaum
John J. Taylor
Ping King Tien
John A. Tillinghast
Klaus D. Timmerhaus
John W. Townsend, Jr.
Myron Tribus
Howard S. Turner
James G. Wenzel
David C. White
Robert V. Whitman
Robert L. Wiegel
Herbert H. Woodson
Lotfi A. Zadeh

30 TO 34 YEARS

Names in bold celebrated their 30th year in 2010

Egil Abrahamsen
H. Norman Abramson
Andreas Acrivos
Arthur P. Adamson
Harold M. Agnew
Clarence R. Allen
John G. Anderson
Alfredo H-S. Ang
Neil A. Armstrong
Seymour Baron
John W. Batchelor
Wallace B. Behnke
C. Gordon Bell
Daniel Berg
Donald C. Berkey
Elwyn R. Berlekamp
Franklin H. Blecher
Donald J. Blickwede
Erich Bloch
Michel Boudart
Harry E. Bovay, Jr.
John E. Breen
Howard Brenner
William B. Bridges
Frederick P. Brooks, Jr.
David Brown
Per V. Bruel
Lloyd S. Cluff
Esther M. Conwell
Fernando J. Corbato
Alan Cottrell
Eugene E. Covert
Harvey G. Cragon
Stephen H. Crandall
Douglass D. Crombie
Charles Crussard
Jose B. Cruz, Jr.
Elio D'Appolonia
J. F. Davidson
Ruth M. Davis
Robert C. Dean, Jr.
Robert G. Dean
Raymond F. Decker
Anthony J. DeMaria
Charles A. Desoer*
John E. Dolan
Robert A. Duffy
Ira Dyer
Rex A. Elder
Leo Esaki
Von R. Eshleman
Robert R. Everett
Thomas E. Everhart
Joseph Feinstein
Steven J. Fenves
James L. Flanagan
Merton C. Flemings
Douglas W. Fuerstenau
Yuan-Cheng B. Fung
Tasuku Fuwa
Theodore V. Galambos
Robert G. Gallager
William J. Galloway
Richard L. Garwin
Welko E. Gasich
Edwin A. Gee
Ronald L. Geer
Solomon W. Golomb
John B. Goodenough
Eugene I. Gordon
George W. Govier
Andrew S. Grove
Wolf Hafele
Robert N. Hall
Arthur G. Hansen*
Stephen E. Harris
William J. Harris, Jr.
Julius J. Harwood
George N. Hatsopoulos
William R. Hawthorne
George H. Heilmeier
Robert W. Hellwarth
Joseph M. Hendrie
William C. Hittinger
David G. Hoag
Philip G. Hodge
Charles H. Holley
D. Brainerd Holmes
Kenneth F. Holtby
Edward E. Hood, Jr.
Charles L. Hosler, Jr.
W. Jack Howard*
Michel Hug
K. Uno Ingard
Sheldon E. Isakoff
Donald G. Iselin
Noel Jarrett
George W. Jeffs
Paul C. Jennings
Robert L. Johnson
Jan Kaczmarek
John W. Kalb
Edward R. Kane
Eneas D. Kane
William M. Kays
Bernard H. Kear
Herbert H. Kellogg
Jack L. Kerrebrock
Clyde E. Kesler
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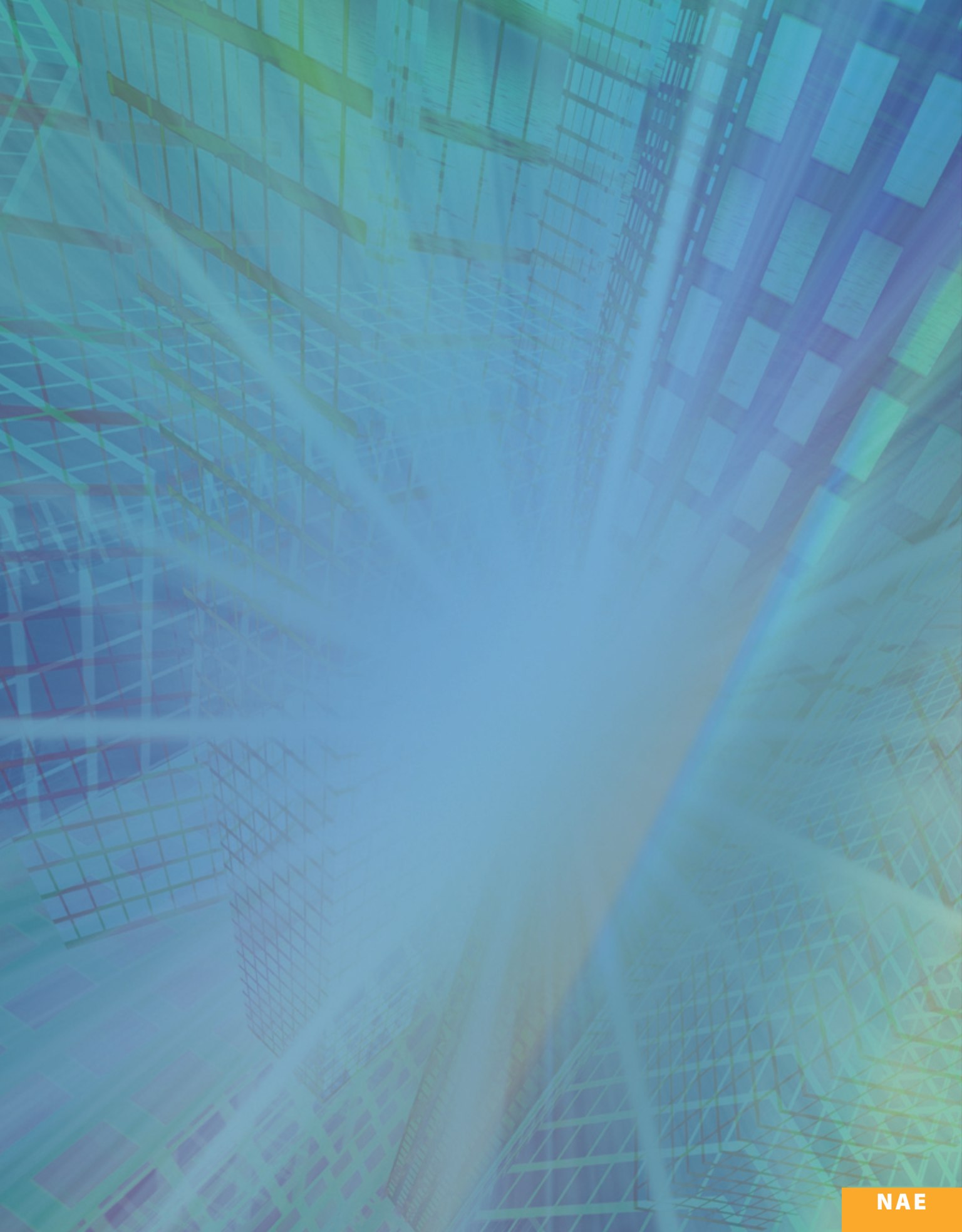

NATIONAL ACADEMY OF ENGINEERING FUND FINANCIAL REPORT

Governed by the National Academy of Engineering Fund (NAEF) Board of Trustees, the NAEF is the tax-exempt corporation (under section 501(c)(3) of the Internal Revenue Code) that serves as a holding entity for the independent assets and operating funds of the National Academy of Engineering (NAE). The NAE operates within the charter and framework of the National Academy of Sciences (NAS).

The table on page 38 summarizes both the NAEF and outside operating revenue and expenses as well as non-operation-related transactions for the NAE for 2010 and 2009. The information on the NAEF presented in this table has been extracted from the Fund's audited financial statements also contained in this report.

During 2010, contributions for the National Academy of Engineering were solicited from corporations, NAE members, and private foundations. These funds and contracts and grants from the federal government are a major source of support for the Academy's self-initiated programs, which are described in this report.

A second source of revenue for the Academy is the allocation from the overhead charge assessed on government and privately funded contracts for National Research Council (NRC) projects; the NRC is the operating arm of the NAE and the National Academy of Sciences. This allocation is used to offset expenses incurred in the oversight function and for such other administrative operations as NAE membership services and governance.

Under a policy established by the NAEF Board of Trustees, the Academy may use a certain percent of its unrestricted invested assets for operations each year. In 2010, 2.5 percent was allocated for normal operating expenses and 3.5 percent was allocated for fund-raising expenses. This allocation, combined with annual meeting registration fees, membership dues, and investment earnings on current operating funds, make up the remainder of the Academy's operating revenue.

The Academy welcomes corporate and private gifts, which are used to help finance the research, education, and public information programs of the institution. The NAE does not, however, conduct proprietary studies for private clients or corporations.

NAE/NAEF Combined Summary of Revenues, Expenses, and Changes in Net Assets (Unaudited-Pro Forma)

(Thousands of Dollars)

	2010	2009
NET ASSETS, BEGINNING	**$56,456**	**$49,563**
CONTRIBUTIONS RECEIVABLE, NET	**3,495**	**4,140**
TOTAL ASSETS, BEGINNING	$59,951	$53,703
OPERATIONS		
Revenue		
Contributions (Unrestricted)	$1,203	$1,566
Dues (Annual), Fees, Miscellaneous	232	236
Indirect Allowance From Contracts and Grants	3,400	3,242
Award Specific Funds Allocation to Operations*	515	2,081
Program Specific Funds Allocation to Operations*	3,536	4,359
Unrestricted Allocation to Operations	1,862	2,054
Total Operations Revenue	**$10,748**	**$13,538**
Expenses		
Awards	$545	$2,096
Development	1,085	1,106
Management	2,452	2,405
Membership	1,547	1,300
National Academies Activities	283	340
Programs	4,732	5,497
Total Operations Expenses	**$10,644**	**$12,744**
OPERATIONS SURPLUS	**$104**	**$794**
NONOPERATIONAL TRANSACTIONS		
Allocation to Operations	($3,691)	($5,590)
Contributions to Reserves	3,373	5,344
Dues (Lifetime), Miscellaneous	107	118
Gain on Investments	4,670	5,854
Investment Earnings (Interest and Dividends)	683	779
Investment Fees	(476)	(406)
NONOPERATIONAL GAIN	**$4,666**	**$6,099**
NET ASSETS, ENDING	**$61,226**	**$56,456**
CONTRIBUTIONS RECEIVABLE, NET	**1,013**	**3,495**
TOTAL ASSETS, ENDING	$62,239	$59,951

*Restricted funds are reported in this unaudited-pro forma report as operating revenue when earned

*NOTE: The audited financial statements that follow record contributions as revenue the year in which the pledge is received in accordance with generally accepted accounting principles.

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McLean, VA 22102-7838

T 703.847.7500
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Report of Independent Certified Public Accountants

Board of Trustees
National Academy of Engineering Fund

We have audited the accompanying statements of financial position of the National Academy of Engineering Fund (the Fund) as of December 31, 2010 and 2009, and the related statements of activities and changes in net assets and cash flows for the years then ended. These financial statements are the responsibility of the Fund's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with auditing standards generally accepted in the United States of America, as established by the American Institute of Certified Public Accountants. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Fund's internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used, and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the National Academy of Engineering Fund as of December 31, 2010 and 2009, and the changes in its net assets and its cash flows for the years then ended, in conformity with accounting principles generally accepted in the United States of America.

McLean, Virginia
May 20, 2011

Grant Thornton LLP

National Academy of Engineering Fund
Statement of Financial Position

December 31,	2010	2009
ASSETS		
Current Assets		
Cash and cash equivalents	$ 246,040	$ 1,223,760
Prepaid expenses	2,955	36,634
Accounts receivable–National Academy of Sciences	—	248,389
Short-term investments	1,319,711	2,112,796
Contribution receivable	496,043	2,577,832
Award medals and other assets	81,728	88,624
Total Current Assets	2,146,477	6,288,035
Non-current Assets		
Contribution receivable–long-term portion, net	26,477	261,216
Beneficial interest in split interest agreements	490,836	656,672
Investments	60,280,771	52,745,404
Total Non-current Assets	60,798,084	53,663,292
Total Assets	$ 62,944,561	$ 59,951,327
LIABILITIES AND NET ASSETS		
Current Liabilities		
Accounts payable–National Academy of Sciences	$ 705,654	$ —
Net Assets		
Unrestricted	24,518,821	22,389,573
Temporarily restricted	8,510,769	8,374,110
Permanently restricted	29,209,317	29,187,644
Total Net Assets	62,238,907	59,951,327
Total Liabilities and Net Assets	$ 62,944,561	$ 59,951,327

The accompanying notes are an integral part of this statement.

National Academy of Engineering Fund
Statement of Activities and Changes in Net Assets

Year ended December 31,

	2010			
	Unrestricted	Temporarily Restricted	Permanently Restricted	Total
Revenue				
Interest and dividends	$ 319,460	$ 363,336	$ —	$ 682,796
Realized loss on investments	(290,322)	(330,007)	—	(620,329)
Contributions	865,685	1,046,077	21,673	1,933,435
Membership dues	236,080	—	—	236,080
Registration fees	100,180	—	—	100,180
Miscellaneous revenue	2,245	21,537	—	23,782
Net assets released from restrictions:				
Satisfaction of program restrictions	2,189,583	(2,189,583)	—	—
Satisfaction of time restrictions	448,578	(448,578)	—	—
Total Revenue	3,871,489	(1,537,218)	21,673	2,355,944
Expenses				
Program services:				
Programs	2,213,333	—	—	2,213,333
Member programs	351,141	—	—	351,141
Support for NRC and NAS	282,642	—	—	282,642
Awards	544,836	—	—	544,836
Total program services	3,391,952	—	—	3,391,952
Supporting services:				
Fundraising	1,085,447	—	—	1,085,447
Operations	1,020,002	—	—	1,020,002
Total supporting services	2,105,449	—	—	2,105,449
Total Expenses	5,497,401	—	—	5,497,401
Change in Net Assets Before Unrealized Gain on Investments	(1,625,912)	(1,537,218)	21,673	(3,141,457)
Unrealized gain on investments	3,755,160	1,673,877	—	5,429,037
Change in Net Assets	2,129,248	136,659	21,673	2,287,580
Net Assets, beginning of year	22,389,573	8,374,110	29,187,644	59,951,327
Net Assets, end of year	$ 24,518,821	$ 8,510,769	$ 29,209,317	$ 62,238,907

The accompanying notes are an integral part of this statement.

National Academy of Engineering Fund
Statement of Activities and Changes in Net Assets

Year ended December 31,

	2009			
	Unrestricted	Temporarily Restricted	Permanently Restricted	Total
Revenue				
Interest and dividends	$ 377,445	$ 401,877	$ —	$ 779,322
Realized loss on investments	(3,300,640)	(3,512,650)	—	(6,813,290)
Contributions	1,358,997	4,676,952	66,387	6,102,336
Membership dues	251,040	—	—	251,040
Registration fees	99,060	—	—	99,060
Miscellaneous revenue	4,557	—	—	4,557
Net assets released from restrictions:				
Satisfaction of program restrictions	3,927,265	(3,927,265)	—	—
Satisfaction of time restrictions	202,343	(202,343)	—	—
Total Revenue	2,920,067	(2,563,429)	66,387	423,025
Expenses				
Program services:				
Programs	2,364,446	—	—	2,364,446
Member programs	209,376	—	—	209,376
Support for NRC and NAS	340,205	—	—	340,205
Awards	2,095,853	—	—	2,095,853
Total program services	5,009,880	—	—	5,009,880
Supporting services:				
Fundraising	1,105,275	—	—	1,105,275
Operations	917,847	—	—	917,847
Total supporting services	2,023,122	—	—	2,023,122
Total Expenses	7,033,002	—	—	7,033,002
Change in Net Assets Before Unrealized Gain on Investments	(4,112,935)	(2,563,429)	66,387	(6,609,977)
Unrealized gain on investments	7,601,749	5,256,404	—	12,858,153
Change in Net Assets	3,488,814	2,692,975	66,387	6,248,176
Net Assets, beginning of year	18,900,759	5,681,135	29,121,257	53,703,151
Net Assets, end of year	$ 22,389,573	$ 8,374,110	$ 29,187,644	$ 59,951,327

The accompanying notes are an integral part of this statement.

National Academy of Engineering Fund
Statement of Cash Flows

Year ended December 31,	2010	2009
Cash Flows from Operating Activities		
Change in net assets	$ 2,287,580	$ 6,248,176
Adjustments to reconcile change in net assets to net cash used in operating activities:		
Realized loss on investments	620,239	6,813,290
Unrealized gain on investments	(5,429,037)	(12,858,153)
Changes in assets and liabilities:		
Contribution receivable	2,316,528	841,836
Beneficial interest in split interest agreements	165,836	(197,521)
Award medals	6,896	29,377
Prepaid expenses	33,679	753
Accounts payable/receivable–National Academy of Sciences	954,043	(1,015,788)
Net Cash Provided by (Used in) Operating Activities	955,764	(138,030)
Cash Flows from Investing Activities		
Proceeds from sale of investments	50,447,554	87,580,623
Purchase of investments	(52,381,038)	(86,355,966)
Net Cash (Used in) Provided by Investing Activities	(1,933,484)	1,224,657
Net Change in Cash and Cash Equivalents	(977,720)	1,086,627
Cash and Cash Equivalents, beginning of year	1,223,760	137,133
Cash and Cash Equivalents, end of year	$ 246,040	$ 1,223,760

The accompanying notes are an integral part of this statement.

December 31, 2010 and 2009

NOTE A—GENERAL INFORMATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

General Information

The National Academy of Engineering Fund (the Fund) is an independent non-profit organization established by the National Academy of Engineering (NAE) to collect and disburse funds for accomplishing the goals of NAE. NAE operates within the charter and framework of the National Academy of Sciences (NAS), which accounts for NAE's expenses. The operating expenditures of NAE are accounted for by offices of NAS, and are offset by reimbursement from funds received from the Fund and from contracts and grants administered by NAS. The net expenditures of NAE are paid by the Fund to balance accounts with NAS.

Basis of Accounting

The Fund's financial statements are prepared using the accrual basis of accounting in accordance with the generally accepted accounting principles in the United States of America ("GAAP").

Cash and Cash Equivalents

For purposes of the statement of cash flows, the Fund considers all investments purchased with an original maturity of three months or less to be cash equivalents, except for the cash in the investment portfolio, which will be reinvested on a long-term basis. The Fund's cash management policies limit its exposure to a concentration of credit risk by maintaining cash accounts at financial institutions whose deposits are insured by the Federal Deposit Insurance Corporation (FDIC). Cash deposits may exceed the FDIC insurable limit at times throughout the year due to unanticipated large contributions. Management does not consider this to be a significant credit risk.

Short-term Investments

Temporary investments consist of money market funds that are used to fund normal operations of the Fund and are recorded at their readily determinable fair values as determined by quoted market prices.

Contributions Receivable

Unconditional promises to give (pledges) are recognized as revenue and contributions receivable in the period the promises are made. Unconditional promises to give that are expected to be collected within one year are recorded at their net realizable value. Unconditional promises to give that are expected to be collected in future years are recorded at the present value of their estimated future cash flows. The discounts on those amounts are computed using risk-free interest rates commensurate with the risk involved applicable to the years in which the promises are received. Amortization of the discounts is included in contribution revenue. Conditional promises to give are not included as support until the conditions are substantially met.

Split-interest Agreements

Charitable gift annuity agreements are classified as a beneficial interest in split interest agreements in the statements of financial position. The Fund, has been notified that it was designated as the remainder beneficiary for several charitable remainder trusts. The Fund has an agreement with NAS whereas NAS and not the Fund serves as the trustee of the assets. The Fund has recorded an asset and contribution revenue equal to the present value of the remainder interest. The remainder interest was determined by using the fair market value of trust assets, less the estimated distributions to the income beneficiary over the Trust term. Upon termination of an annuity, the remainder interest in the asset is available for use by the Fund as restricted or unrestricted assets in accordance with the donor's designation. On an annual basis, the Fund re-measures the value of the asset using current assumptions. Any change in such value is recorded as a change in value of split interest agreements on the statement of activities.

Awards Medals

The Fund maintains gold medals for various awards, which are carried at cost.

NOTE A—GENERAL INFORMATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (Continued)

Fair Value of Financial Instruments

The Fund has adopted the guidance that defines fair value, establishes a framework for measuring fair value in accordance with US GAAP, and expands disclosures about fair value measurements. Where applicable, such information has been disclosed elsewhere in the notes to the financial statements.

Level 1 inputs include quoted market prices in active markets for identical assets. Level 2 inputs include inputs other than quoted prices in active markets that are either directly or indirectly observable; and Level 3, defined as unobservable inputs in which little or no market data exists, therefore requiring an entity to develop its own assumptions. Level 3 inputs are used to measure fair value to the extent that observable inputs are not available, thereby allowing for situations where there is little, if any, observable market activity for the asset at the measurement date.

Investments

Investments held by the Fund are presented at their fair market value. Investments consist of cash and money market funds, federal agency securities, treasury securities, corporate debt securities, equity securities and other investments. The fair value of all debt and equity securities with a readily determinable market value are based on published market prices. The alternative investments, which are not readily marketable, are carried at estimated fair values as provided by the investment managers. The Fund reviews and evaluates the values provided by the investment managers and agrees with the valuation methods and assumptions used in determining the fair value of the alternative investments. Those estimated fair values may differ significantly from the values that would have been used had a ready market for these securities existed.

Unrealized gains and losses are reflected in the statement of activities and changes in net assets as non-operating.

Temporarily Restricted Net Assets

Temporarily restricted net assets consist of amounts that are subject to donor-imposed time or purpose restrictions and income earned on temporarily and permanently restricted net assets. The Fund is permitted to use or expend the donated assets in accordance with the donor restriction.

Permanently Restricted Net Assets

Permanently restricted net assets consist of assets whose use is limited by donor-imposed restrictions that neither expire by the passage of time nor can be fulfilled or otherwise removed by action of the Fund. The restrictions stipulate that resources be maintained permanently, but permit the Fund to expend the income generated in accordance with the provisions of the agreement. Permanently restricted net assets consist of the following:

Draper Prize–represents an endowment given by the donor for the purpose of establishing and awarding an annual prize in honor of the memory of Charles Stark Draper. It is the Fund's intention to use the investment earnings of the endowment to cover the expenses incurred in connection with administration of the prize and in providing the honorarium awarded with the prize.

Gordon Prize–represents an endowment given by the donor for the purpose of establishing and awarding an annual prize in honor of Bernard M. Gordon. It is the Fund's intention to use the investment earnings of the endowment to cover the expenses incurred in connection with administration of the prize and in providing the honorarium awarded with the prize.

Capital Preservation and Hans Reissner–represent endowments requiring principal be maintained in perpetuity and that only the income be used for general operations of NAE.

Hollomon–represents an endowment requiring that the principal be maintained in perpetuity and that the income be used to support the Hollomon Fellow.

NOTE A—GENERAL INFORMATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (Continued)

Industry Scholar–represents an endowment to support fellowships for recently retired corporate executives to assist with strategy and management of program activities in NAE and NRC.

Senior Scholar–represents an endowment to support an outstanding member of industry or another field working as an advisor and assistant to the president of NAE in the management and execution of NAE's programmatic activities.

Young Engineer–represents an endowment to support programs aimed at engaging engineers at a younger age in the activities of NAE, and to provide an opportunity to identify nominees from industry for membership in NAE.

Wm. A. Wulf Initiative for Engineering Excellence–represents an endowment to ensure the future of programs that Bill Wulf instituted as president and provide his successor some flexibility in addressing the most pressing issues before the engineering community and the nation at any given time.

Restricted Support

The Fund reports gifts of cash and other assets as restricted support if they are received with donor stipulations that limit the use of the donated assets. When a donor restriction expires, i.e., when a stipulated time restriction ends or purpose restriction is accomplished, temporarily restricted net assets are reclassified to unrestricted net assets and reported in the statement of activities as net assets released from restrictions.

Allocation of Expenses

The costs of providing various programs and other activities have been summarized on a functional basis in the statement of activities. Accordingly, certain costs have been allocated among the programs and supporting services benefited.

Income Taxes

The Fund is incorporated under the District of Columbia Non-profit Corporation Act and is exempt from income taxes under Section 501(c)(3) of the Internal Revenue Code. In addition, the Fund has been determined by the Internal Revenue Service not to be a private foundation. The Fund is required to remit income taxes to the federal government and the District of Columbia for unrelated business income. For the years ended December 31, 2010 and 2009, there was no unrelated business income and, consequently, no provision for income taxes has been made.

Effective in 2009, the Fund adopted new guidance that creates a single model to address uncertainty in tax positions and clarified the accounting for income taxes by prescribing the minimum recognition threshold a tax position is required to meet before being recognized in its financial statements. Under the requirements of this guidance, organizations could now be required to record an obligation as the result of tax positions they have historically taken on various tax exposure items. The impact of the adoption of this guidance did not have a material effect on the financial statements of the Fund. Prior to the adoption of this guidance, the determination of when to record a liability for a tax exposure was based on whether a liability was considered probable and reasonably estimable in accordance with guidance concerning recording of contingencies.

Use of Estimates

In preparing financial statements in conformity with accounting principles generally accepted in the United States of America, management is required to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements and revenue and expenses during the reporting period. The most significant assumptions relate to the realization of pledges receivable and the fair value measurement of investments. Actual results could differ from those estimates.

NOTE A—GENERAL INFORMATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (Continued)

Reclassifications

Certain 2009 amounts have been reclassified to conform to the 2010 presentation.

Recent Accounting Pronouncements

In September 2009, the FASB issued guidance to amend the existing requirements in ASC 820 to measure the fair value of investments in certain entities that do not have a quoted market price but calculate net asset value (NAV) per share or its equivalent. As a practical expedient, the amendments permit, but do not require, an entity to measure the fair value of an investment in an investee within the scope of the amendments based on the investee's NAV per share or its equivalent. As a result of applying the practical expedient, the Entity's investment in alternative investments was determined based on the NAV beginning with the December 31, 2009 valuation. Prior to the adoption of the new guidance, the Entity adjusted the NAV for liquidity restrictions and lockups that were characteristics of the Fund's investments, but not of the underlying investments for which NAV was determined.

The adoption of the amended guidance did not have a material impact on the fair value determination of the applicable investments, however, it did require additional disclosures. The disclosures required by the guidance are included in Note C – Investments.

In January 2010, the FASB issued guidance that clarifies existing disclosures and requires new disclosures about fair value measurements. The clarifications and the requirement to disclose the amounts and reasons for significant transfers between Level 1 and Level 2 and significant transfers into and out of Level 3 of the fair value hierarchy are effective for periods beginning after December 15, 2009. The new requirement that purchases, sales, issuances, and settlements be presented gross in the Level 3 reconciliation is effective for fiscal years beginning after December 15, 2010 and for interim periods within those years, with early adoption permitted. Since this new guidance only amends the disclosure requirements, it did not have any impact on the Fund's financial statements.

NOTE B—CONTRIBUTIONS RECEIVABLE

Contributions receivable consist of unconditional promises to give and are deemed fully collectible as follows at December 31, 2010:

	Unrestricted	Restricted	Total
Unconditional promises to give	$ 171,700	$ 351,343	$ 523,043
Less: unamortized discount	(523)	—	(523)
Net unconditional promises to give	$ 171,177	$ 351,343	$ 522,520
Amounts due in:			
Less than 1 year	$ 144,700	$ 351,343	$ 496,043
1 to 5 years	26,477	—	26,477
	$ 171,177	$ 351,343	$ 522,520

Contributions receivable consist of unconditional promises to give and are deemed fully collectible as follows at December 31, 2009:

	Unrestricted	Restricted	Total
Unconditional promises to give	$ 453,360	$ 2,430,116	$ 2,883,476
Less: unamortized discount	—	(44,428)	(44,428)
Net unconditional promises to give	$ 453,360	$ 2,385,688	$ 2,839,048
Amounts due in:			
Less than 1 year	$ 453,360	$ 2,124,472	$ 2,577,832
1 to 5 years	—	261,216	261,216
	$ 453,360	$ 2,385,688	$ 2,839,048

NOTE B—CONTRIBUTIONS RECEIVABLE (Continued)

There were no unconditional promises to give received during the year ended December 31, 2010 (excluding prior year promises) measured at fair value on a nonrecurring basis. Unconditional promises measured at fair value on a nonrecurring basis for the year ended December 31, 2009 are as follows:

	2009			
	Amount	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Contribution commitments	$ 74,716	$ —	$ 74,716	$ —
	$ 74,716	$ —	$ 74,716	$ —

NOTE C—INVESTMENTS

Investments at fair value consist of the following at December 31:

	2010	2009
Cash and money market	$ 8,017,187	$ 15,714,496
Federal Agency securities	576,330	—
Corporate debt securities	6,363,510	6,162,184
Equity securities	8,853,798	10,003,930
Other	37,789,657	22,977,590
	61,600,482	54,858,200
Less: short-term investments	(1,319,711)	(2,112,796)
	$ 60,280,771	$ 52,745,404

NOTE C—INVESTMENTS (Continued)

Investments measured at fair value on a recurring basis are as follows as of December 31:

	2010			
	Amount	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash and money market	$ 8,017,187	$ 8,017,187	$ —	$ —
Corporate debt securities	6,363,510	4,329,410	2,034,100	—
Federal Agency securities	8,853,798	8,853,798	—	—
Government obligations	576,330	576,330	—	—
Other	37,789,657	—	—	37,789,657
	$ 61,600,482	$ 21,776,725	$ 2,034,100	$ 37,789,657

	2009			
	Amount	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash and money market	$ 15,714,496	$ 15,714,496	$ —	$ —
Corporate debt securities	6,162,184	3,815,918	2,346,266	—
Equity Securities	10,003,930	8,973,247	—	—
Other	22,977,590	—	—	24,008,273
	$ 54,858,200	$ 28,503,661	$ 2,346,266	$ 24,008,273

NOTE C—INVESTMENTS (Continued)

The following is a description of the valuation methodologies used for assets and liabilities measured at fair value. There have been no changes in the methodologies used at December 31, 2010 and 2009.

Cash and money market, corporate debt securities, certain equity securities and mutual funds are valued at the closing price reported on the active market on which the individual (or similar) securities are traded.

Alternative investments include hedge funds, private equity securities, managed futures and limited partnership interests have been estimated using the net asset value per share of the investments.

Beneficial interests in split-interest agreements held by others are measured at the present value of future cash flows considering the estimated return on the invested assets during the expected term of the agreements, the contractual payment obligations under the agreement, and a discount rate commensurate with the risks involved. Split-interest agreements held by others are classified as Level 3 within the fair value hierarchy.

The table below sets forth a summary of changes in fair value of the Fund's level 3 assets, including the beneficial interests in split-interest agreements, for the years ended December 31:

	2010				
	Hedge Fund	**Private Equity**	**Limited Partnership**	**Split Interest Agreement**	**Total**
Balance, beginning of year	$ 21,864,669	$ 1,112,921	$ 1,030,683	$ 656,672	$ 24,664,945
Purchases and sales, net	9,919,250	650,793	(264,226)	(304,347)	10,001,470
Net unrealized and realized gain	3,096,832	157,371	221,364	138,511	3,614,078
Balance, end of year	$ 34,880,751	$ 1,921,085	$ 987,821	$ 490,836	$ 38,280,493

NOTE C—INVESTMENTS (Continued)

	2009					
	Hedge Fund	Private Equity	Limited Partner-ships	Managed Futures	Split Interest Agreements	Total
Balance, beginning of year	$ 6,816,408	$ 629,984	$ 1,241,370	$ 9,243,633	$ 459,151	$ 18,390,546
Purchases and sales, net	12,017,161	374,641	(71,183)	(8,809,278)	6,637	3,517,978
Net unrealized and realized gain (loss)	3,031,100	108,296	(139,504)	(434,355)	190,884	2,756,421
Balance, end of year	$ 21,864,669	$ 1,112,921	$ 1,030,683	$ —	$ 656,672	$ 24,664,945

Investments are further classified as follows at December 31:

	2010	2009
Unrestricted	$ 24,560,484	$ 22,232,889
Temporarily restricted	9,334,126	6,421,969
Permanently restricted	27,705,872	26,203,342
	$ 61,600,482	$ 54,858,200

Investment return consists of the following at December 31:

Dividends and interest	$ 682,796	$ 779,322
Unrealized gain	5,429,037	12,858,153
Realized loss	(620,329)	(6,813,290)
	$ 5,491,504	$ 6,824,185

NOTE C—INVESTMENTS (Continued)

The table below presents additional information for the Fund's investments, as of December 31, 2010, whose fair value is estimated using the practical expedient of reported net asset value (NAV). These disclosures are required for all investments that are eligible to be valued using the practical expedient, regardless of whether the practical expedient has been applied.

The following table presents the nature and risk of assets with fair values estimated using NAV held at December 31, 2010:

	Fair Value	Unfunded Commitment	Redemption Frequency	Redemption Notice Period
Fund of hedge funds – Multi-strategies (a)	$ 26,617,832	$ N/A	Quarterly	60 days – 1 Year
Fund of hedge funds – Multi-strategies, multi- vehicles (b)	5,567,649	N/A	Monthly – Annually	30-90 days
Hedge fund – Restructuring and value (c)	2,695,270	N/A	Annually	60 Days
Private Equity – multiple strategies (d)	1,582,159	2,177,965	Upon liquidation of the fund	N/A
Private equity – single strategy (e)	338,926	150,000	N/A	N/A
Limited partnership (f)	987,821	60,000	Upon dissolution of the partnership	N/A
Total	$ 37,789,657	$ 2,387,965		

(a) This category includes investments in funds of hedge funds that use multiple strategies to obtain total returns on a leveraged basis. The funds invest in a broad range of equity instruments, including international, domestic, and private equity. The funds also invest in fixed income, and alternative asset classes. The fund's portfolio is designed to achieve equity-like returns at fixed income risk levels. The funds are subject to a 2 year lockout, after which the fund allows quarterly distributions up to 5% of the investment balance.

NOTE C—INVESTMENTS (Continued)

(b) This category includes investments in a multi-strategy, multi-vehicle hedge fund with the objective of maximizing long-term, risk adjusted returns and capital appreciation. The funds have investments in multiple investees which trade in various financial instruments such as, but not limited to, domestic and international securities, fixed income debt, government securities, real estate investment trusts, and derivatives.

(c) Investment funds in this strategy invest in securities of companies that are believed to be significantly undervalued some of which are in Chapter 11 bankruptcy. The other fund invests in equity and debt of companies it deems to be undervalued. Both funds invest in a master fund which includes derivatives.

(d) This category includes investments in private equity, venture capital and distressed securities and other non-traditional categories on a global basis. The other fund make indirect investments in emerging private markets including private equity and distressed securities.

(e) The fund investments in private equity companies that provide infrastructure. The fund seeks investments that have a desirable risk return profiles which will deliver, in aggregate, a gross target IRR of 12-15% with prudent leverage. The leverage strategy primarily revolves around the following principles: structure debt capita to investment grade standards whenever possible; developing matching debt duration profiles to respective assets' cash flow profiles; and avoiding floating interest rate exposure, either through the use of fixed rate debt or interest hedging activities.

(f) This category includes investment in a limited partnership who invests in private equity funds engaged in venture capital, buyouts and growth capital, international private equity, and other private equity investments. The Fund may receive distributions-in-kind from the Partnership Investments representing securities of the Partnership Investments' underlying portfolio companies.

NOTE D—PERMANENTLY AND TEMPORARILY RESTRICTED NET ASSETS

Permanently and temporarily restricted net assets consist of the following at December 31, 2010:

	Permanently Restricted	Temporarily Restricted
Draper Prize	$ 8,000,000	$ 744,834
Gordon Prize	13,438,250	—
Capital Preservation	2,397,701	333,770
Hollomon	201,200	305,993
Frontiers of Engineering Education	—	153,056
Public Understanding	—	826,718
Technology and Environment	—	6,431
Frontiers of Engineering	—	55,876
Bueche Award	—	137
CASEE	—	6,134
Russ Prize	—	31,410
Engineering Ethics Center	—	25,064
Diversity in the Engineering Work Force	—	127
Engineering Education	—	63
Frontiers of Engineering – Grainger Foundation	—	2,130,397
Hans Reissner	25,624	11,574
Engineering Ethics	—	356,476
Information Technology	—	31,022
Engineering & Services	—	1,272
Homeland Security	—	8,495
Communication with Public in Crisis	—	1,917
Industry Scholar	353,037	65,726
Senior Scholar	1,000,000	—
Young Engineer	778,640	721
Noise Policy Development	—	120,016
Urban Infrastructure	—	357,941
National Academy of Engineering Roundtable	—	108,190
Engineering Education & Research	—	48,046
Wm. Wulf Initiative for Engineering Excellence	3,014,865	39,632
President's Discretionary	—	2,139,893
Unrestricted contributions to be received in future years	—	497,745
Others	—	102,093
	$ 29,209,317	$ 8,510,769

NOTE D—PERMANENTLY AND TEMPORARILY RESTRICTED NET ASSETS (Continued)

Permanently and temporarily restricted net assets consist of the following at December 31, 2009:

	Permanently Restricted	Temporarily Restricted
Draper Prize	$ 8,000,000	$ 139,223
Gordon Prize	13,438,250	—
Capital Preservation	2,379,526	190,727
Hollomon	201,200	271,108
Frontiers of Engineering Education	—	409,452
Public Understanding	—	436,349
Technology and Environment	—	6,437
Frontiers of Engineering	—	61,046
Bueche Award	—	4,514
CASEE	—	12,189
Russ Prize	—	65,701
Engineering Ethics Center	—	25,092
Diversity in the Engineering Work Force	—	127
Engineering Education	—	1,835
Frontiers of Engineering - Grainger Foundation	—	2,448,918
Hans Reissner	25,624	9,707
Engineering Ethics	—	486,054
Information Technology	—	28,169
Engineering & Services	—	1,273
Homeland Security	—	8,505
Communication with Public in Crisis	—	1,917
Industry Scholar	353,038	28,559
Senior Scholar	1,000,000	—
Young Engineer	778,640	—
Noise Policy Development	—	120,016
Urban Infrastructure	—	358,339
Engineering Education & Research	—	71,808
Wm. Wulf Initiative for Engineering Excellence	3,011,366	—
President's Discretionary	—	2,366,381
Unrestricted contributions to be received in future years	—	672,669
Others	—	147,995
	$ 29,187,644	$ 8,374,110

NOTE E—ENDOWMENT

As required by GAAP, net assets associated with endowment funds are classified and reported based on the existence or absence of donor-imposed restrictions.

During 2008, the District of Columbia enacted into law the Uniform Prudent Management of Institutional Funds Act (UPMIFA). Management of NAEF has interpreted the District of Columbia law as requiring the Fund, absent explicit donor stipulations to the contrary, to act in good faith and with the care that an ordinarily prudent person in a like position would exercise under similar circumstances in making determinations to appropriate or accumulate endowment funds, taking into account both its obligation to preserve the value of the endowment and its obligation to use the endowment to achieve the purposes for which it was donated. NAEF classifies as permanently restricted net assets (a) the original value of gifts donated to the permanent endowment, (b) the original value of subsequent gifts to the permanent endowment, and (c) accumulations to the permanent endowment made in accordance with the direction of the applicable donor gift instrument at the time the accumulation is added to the fund. The remaining portion of the donor-restricted endowment fund that is not classified in permanently restricted net assets is classified as temporarily restricted net assets until those amounts are appropriated for expenditure. In making a determination to appropriate or accumulate, the Fund adheres to the standard of prudence prescribed by the Act and considers the following factors: (1) The duration and preservation of the endowment fund; (2) The purposes of the institution and the endowment fund; (3) General economic conditions; (4) The possible effect of inflation or deflation; (5) The expected total return from income and the appreciation of investments; (6) Other resources of the institution; and (7) The investment policy of the institution.

The fair value of assets associated with donor-restricted endowment funds may fall below the level that UPMIFA requires to retain as a fund of perpetual duration. In accordance with GAAP, deficiencies of this nature that are reported in unrestricted net assets were $1,175,623 and $2,463,217 as of December 31, 2010 and 2009, respectively.

NAEF has adopted an investment policy for the endowment fund. This investment program is based on growing the endowment fund to provide financial stability for NAEF in perpetuity. The NAEF's ability to tolerate risk and volatility should be consistent with that of a conservative growth portfolio, with investments made in companies that demonstrate consistent growth over time. Asset allocations are developed in accordance with this long-term, conservative growth strategy.

NOTE E—ENDOWMENT (Continued)

The following illustrates endowment net asset composition by type of fund and the changes in endowment net assets for the year ended December 31:

2010	Unrestricted	Temporarily Restricted	Permanently Restricted	Total
Donor-restricted endowment funds	$ (1,175,623)	$ 1,502,453	$ 29,209,317	$ 29,536,147
Total funds	$ (1,175,623)	$ 1,502,453	$ 29,209,317	$ 29,536,147

Changes in endowment net assets for the year end December 31 are as follows:

2010	Unrestricted	Temporarily Restricted	Permanently Restricted	Total
Endowment net assets, beginning of Year	$ (2,463,217)	$ 639,323	$ 29,187,644	$ 27,363,750
Investment return:				
Interest and dividends	—	330,987	—	330,987
Realized loss on investments	—	(301,136)	—	(301,136)
Net depreciation	—	2,570,944	—	2,570,944
Total investment return	—	2,600,795	—	2,600,795
Amounts appropriated for Expenditure	—	(450,071)	—	(450,071)
Contributions received	—	—	21,673	21,673
Adjustment from (to) Unrestricted net assets	1,287,594	(1,287,594)	—	—
Endowment net assets, end of year	$ (1,175,623)	$ 1,502,453	$ 29,209,317	$ 29,536,147

NOTE E—ENDOWMENT (Continued)

The following illustrates endowment net asset composition by type of fund and the changes in endowment net assets for the year ended December 31:

2009	Unrestricted	Temporarily Restricted	Permanently Restricted	Total
Donor-restricted endowment funds	$ (2,463,217)	$ 639,323	$ 29,187,644	$ 27,363,750
Total funds	$ (2,463,217)	$ 639,323	$ 29,187,644	$ 27,363,750

Changes in endowment net assets for the year end December 31 are as follows:

2009	Unrestricted	Temporarily Restricted	Permanently Restricted	Total
Endowment net assets, beginning of Year	$ (3,928,415)	$ 254,447	$ 29,121,257	$ 25,447,289
Investment return:				
Interest and dividends	—	376,566	—	376,566
Realized loss on investments	—	(3,299,368)	—	(3,299,368)
Net depreciation	—	6,140,442	—	6,140,442
Total investment return	—	3,217,640	—	3,217,640
Amounts appropriated for Expenditure	—	(1,367,566)	—	(1,367,566)
Contributions received	—	—	66,387	66,387
Adjustment from (to) Unrestricted net assets	1,465,198	(1,465,198)	—	—
Endowment net assets, end of year	$ (2,463,217)	$ 639,323	$ 29,187,644	$ 27,363,750

NOTE F—DESCRIPTION OF PROGRAM AND SUPPORTING SERVICES

The following program and supporting services are included in the accompanying financial statements:

Programs–programs that address relevant issues in the engineering field including, but not limited to: *Education, Engineering Practice and the Engineering Workforce; Engineering and the Environment; Engineering, the Economy and Society; Information Technology and Society; National Security and Crime Prevention; and Public Policy* and *Program Reviews*.

Member Programs–organization and administration of the Annual Meeting and publication of NAE Memorial Tributes.

Support for NRC and NAS–contributions to joint activities of the National Academies, including, but not limited to, the NAS/NAE/IOM Committee on Human Rights, the NRC Office of Scientific and Engineering Personnel, and *Issues in Science and Technology*.

Awards–NAE presents five awards: the Bernard M. Gordon Prize, the Charles Stark Draper Prize, the Fritz J. and Dolores H. Russ Prize, the Arthur M. Bueche Award, and the NAE Founders Award. Activities include soliciting nominations, selection of the recipients, announcement of the recipients and presentation of the prizes.

Fundraising–provides the structure necessary to encourage and secure private financial support from individuals, foundations and corporations.

Operations–includes the functions necessary to provide an adequate working environment, provide coordination and articulation of the Fund's programs, secure proper administrative function of the Board of Trustees, maintain competent legal services for program administration, and manage the financial and budgetary responsibilities of the Fund.

NOTE G—RELATED-PARTY TRANSACTIONS

The National Academies Corporation

The National Academies Corporation (TNAC) is a non-profit corporation that was incorporated in January 1986 for the purpose of constructing and maintaining a study and conference facility, the Arnold and Mabel Beckman Center, in Irvine, California, to expand and support the general scope of program activities of NAS, NAE, the Institute of Medicine (IOM), and NRC. TNAC is organized as a tax-exempt supporting organization for NAS and the Fund. The Board of Directors and officers of TNAC include certain officers of the Fund. The Fund had no transactions with TNAC for the years ended December 31, 2010 and 2009.

National Academy of Sciences

The Fund reimburses NAS by making monthly payments based on NAE's estimated expenditures for the year. The Fund also receives contributions through NAS. This resulted to a receivable from/(payable) to NAS at December 31, 2010 and 2009 of $(705,654) and $248,389, respectively. Payments made to NAS by the Fund for the Fund's allocated portion of the expenditures shared jointly by NAS, NAE and IOM were $1,368,089 and $1,445,332 for the years ending December 31, 2010 and 2009, respectively. See Note A for the relationship of related parties.

NOTE H—SUBSEQUENT EVENTS

The Fund evaluated its December 31, 2010 financial statements for subsequent events through May 20, 2011, the date the financial statements were available to be issued. The Fund is not aware of any subsequent event which would require recognition or disclosure in the accompanying financial statements.

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