

1. Innovation. Science and technology have been responsible for half of the growth of the American economy since WWII. But several recent reports question America's continued leadership in these vital areas. What policies will you support to ensure that America remains the world leader in innovation?

Ensuring that the U.S. continues to lead the world in science and technology will be a central priority for my administration. Our talent for innovation is still the envy of the world, but we face unprecedented challenges that demand new approaches. For example, the U.S. annually imports \$53 billion more in advanced technology products than we export. China is now the world's number one high technology exporter. This competitive situation may only worsen over time because the number of U.S. students pursuing technical careers is declining. The U.S. ranks 17th among developed nations in the proportion of college students receiving degrees in science or engineering; we were in third place thirty years ago.

My administration will increase funding for basic research in physical and life sciences, mathematics, and engineering at a rate that would double basic research budgets over the next decade. We will increase research grants for early-career researchers to keep young scientists entering these fields. We will increase support for high-risk, high-payoff research portfolios at our science agencies. And we will invest in the breakthrough research we need to meet our energy challenges and to transform our defense programs.

A vigorous research and development program depends on encouraging talented people to enter science, technology, engineering, and mathematics (STEM) and giving them the support they need to reach their potential. My administration will work to guarantee to students access to strong science curriculum at all grade levels so they graduate knowing how science works – using hands-on, IT-enhanced education. As president, I will launch a Service Scholarship program that pays undergraduate or graduate teaching education costs for those who commit to teaching in a high-need school, and I will prioritize math and science teachers. Additionally, my proposal to create Teacher Residency Academies will also add 30,000 new teachers to high-need schools – training thousands of science and math teachers. I will also expand access to higher education, work to draw more of these students into science and engineering, and increase National Science Foundation (NSF) graduate fellowships. My proposals for providing broadband Internet connections for all Americans across the country will help ensure that more students are able to bolster their STEM achievement.

Progress in science and technology must be backed with programs ensuring that U.S. businesses have strong incentives to convert advances quickly into new business opportunities and jobs. To do this, my administration will make the R&D tax credit permanent.

2. Climate Change. The Earth's climate is changing and there is concern about the potentially adverse effects of these changes on life on the planet. What is your position on the following measures that have been proposed to address global climate change—a cap-and-trade system, a carbon tax, increased fuel-economy standards, or research? Are there other policies you would support?

There can no longer be any doubt that human activities are influencing the global climate and we must react quickly and effectively. First, the U.S. must get off the sidelines and take long-overdue action here at home to reduce our own greenhouse gas emissions. We must also take a leadership role in designing technologies that allow us to enjoy a growing, prosperous economy while reducing greenhouse gas emissions by 80 percent below 1990 levels by 2050. With the right incentives, I'm convinced that American ingenuity can do this, and in the process make American businesses more productive, create jobs, and make America's buildings and vehicles safer and more attractive. This is a global problem. U.S. leadership is essential but solutions will require contributions from all parts of the world—particularly the rest of the world's major emitters: China, Europe, and India.

Specifically, I will implement a market-based cap-and-trade system to reduce carbon emissions by the amount scientists say is necessary: 80 percent below 1990 levels by 2050. I will start reducing emissions immediately by establishing strong annual reduction targets with an intermediate goal of reducing emissions to 1990 levels by 2020. A cap- and-trade program draws on the power of the marketplace to reduce emissions in a cost- effective and flexible way. I will require all pollution credits to be auctioned.

I will restore U.S. leadership in strategies for combating climate change and work closely with the international community. We will re-engage with the U.N. Framework Convention on Climate Change, the main international forum dedicated to addressing the climate change problem. In addition I will create a Global Energy Forum—based on the G8+5, which includes all G-8 members plus Brazil, China, India, Mexico and South Africa—comprising the largest energy consuming nations from both the developed and developing world. This forum would focus exclusively on global energy and environmental issues. I will also create a Technology Transfer Program dedicated to exporting climate-

friendly technologies, including green buildings, clean coal and advanced automobiles, to developing countries to help them combat climate change.

3. Energy. Many policymakers and scientists say energy security and sustainability are major problems facing the United States this century. What policies would you support to meet demand for energy while ensuring an economically and environmentally sustainable future?

America's challenges in providing secure, affordable energy while addressing climate change mean that we must make much more efficient use of energy and begin to rely on new energy sources that eliminate or greatly reduce greenhouse gas emissions. My programs focus both on a greatly expanded program of federally funded energy research and development and on policies designed to speed the adoption of innovative energy technologies and stimulate private innovation.

First, I have proposed programs that, taken together, will increase federal investment in the clean energy research, development, and deployment by \$150 billion over ten years. This research will cover:

- Basic research to develop alternative fuels and chemicals;
- Equipment and designs that can greatly reduce energy use in residential and commercial buildings – both new and existing;
- New vehicle technologies capable of significantly reducing our oil consumption;
- Advanced energy storage and transmission that would greatly help the economics of new electric-generating technologies and plug-in hybrids;
- Technologies for capturing and sequestering greenhouse gases produced by coal plants; and
- A new generation of nuclear electric technologies that address cost, safety, waste disposal, and proliferation risks.

I will also work closely with utilities to introduce a digital smart grid that can optimize the overall efficiency of the nation's electric utility system, by managing demand and making effective use of renewable energy and energy storage.

Second, it is essential that we create a strong, predictable market for energy innovations with concrete goals that speed introduction of innovative products and provide a strong incentive for private R&D investment in energy technologies. These concrete goals include:

- Increasing new building efficiency by 50 percent and existing building efficiency by 25 percent over the next decade, and taking other steps that will reduce the energy intensity of our economy 50 percent by 2030;
- Increasing fuel economy standards 4 percent per year and providing loan guarantees for domestic auto plants and parts manufacturers to build new fuel- efficient cars domestically;
- Extending the Production Tax Credit for five years and creating a federal Renewable Portfolio Standard that will require that 10 percent of American electricity be derived from renewable sources by 2012 and 25 percent by 2025; and
- Ensuring that regulations and incentives in all federal agencies support the national energy and environmental goals in ways that encourage innovation and ingenuity.

I will also encourage communities around the nation to design and build sustainable communities that cut energy use with walkable community designs and expanded investment in mass transit.

4. Education. A comparison of 15-year-olds in 30 wealthy nations found that average science scores among U.S. students ranked 17th, while average U.S. math scores ranked 24th. What role do you think the federal government should play in preparing K-12 students for the science and technology driven 21st Century?

All American citizens need high quality STEM education that inspires them to know more about the world around them, engages them in exploring challenging questions, and involves them in high quality intellectual work. STEM education is no longer only for those pursuing STEM careers; it should enable all citizens to solve problems, collaborate, weigh evidence, and communicate ideas. I will work to ensure that all Americans, including those in traditionally underrepresented groups, have the knowledge and skills they need to engage in society, innovate in our world, and compete in the global economy.

I will support research to understand the strategies and mechanisms that bring lasting improvements to STEM education and ensure that promising practices

are widely shared. This includes encouraging the development of cutting edge STEM instructional materials and technologies, and working with educators to ensure that assessments measure the range of knowledge and skills needed for the 21st Century. I will bring coherency to STEM education by increasing coordination of federal STEM education programs and facilitating cooperation among state efforts. I recently introduced the "Enhancing Science, Technology, Engineering and Math Education Act of 2008" that would establish a STEM Education Committee within the Office of Science and Technology Policy (OSTP) to coordinate the efforts of federal agencies engaged in STEM education, consolidate the STEM education initiatives that exist within the Department of Education under the direction of an Office of STEM Education, and create a State Consortium for STEM Education. These reforms will strengthen interagency coordination at the federal level, encourage collaboration on common content standards and assessments for STEM education at the state and local levels, and provide a mechanism for sharing the latest innovations and practices in STEM education with educators. I also recently sponsored an amendment, which became law, to the America Competes Act that established a competitive state grant program to support summer learning opportunities with curricula that emphasize mathematics and problem solving.

My education plan is built on the recognition that teachers play a critical role in student learning and achievement. My administration will work closely with states and local communities to ensure that we recruit math and science graduates to the teaching profession. Through Teacher Service Scholarships, a Teacher Residency Program, and Career Ladders, I will transform the teaching profession from one that has too many underpaid and insufficiently qualified teachers to one that attracts the best STEM teaching talent for our schools.

We cannot strengthen STEM education without addressing the broader challenges of improving American education and other priority issues. In addition to a focus on high quality teachers, my comprehensive plan addresses the needs of our most at-risk children, focuses on strong school leaders, and enlists parent and community support. My proposals for a comprehensive "zero to five" program will ensure that children enter school ready to learn. And when they finish school, I will make sure that through the new \$4,000 American Opportunity Tax Credit, they will have access to affordable higher education that will provide them with the science fluency they need to be leaders in STEM fields and across broad sectors of our society.

5. National Security. Science and technology are at the core of national security like never before. What is your view of how science and technology can best be used to ensure national security and

where should we put our focus?

Technology leadership is key to our national security. It's essential to create a coherent new defense technology strategy to meet the kinds of threats we may face—asymmetric conflicts, urban operations, peacekeeping missions, and cyber, bio, and proliferation threats, as well as new kinds of symmetric threats.

When Sputnik was launched in 1957, President Eisenhower used the event as a call to arms for Americans to help secure our country and to increase the number of students studying math and science via the National Defense Education Act. That educational base not only improved our national security and space programs but also led to our economic growth and innovation over the second half of the century. Our nation is again hearing a threatening “ping” in the distance, this time not from a single satellite in space but instead from threats that range from asymmetric conflicts to cyber attacks, biological terror and nuclear proliferation. I will lead the nation to be prepared to meet this 21st-century challenge by investing again in math and science education, which is vital to protecting our national security and our competitiveness.

As president I will also ensure that our defense, homeland security, and intelligence agencies have the strong research leadership needed to revitalize our defense research activities and achieve breakthrough science that can be quickly converted into new capabilities for our security.

This year, I was encouraged to see the Department of Defense (DoD) requested a sharp increase in the basic research budget for breakthrough technologies. More is needed. My administration will put basic defense research on a path to double and will assure strong funding for investments in DoD's applied research programs. We will enhance the connections between defense researchers and their war-fighting counterparts. And, we will strengthen defense research management so that our most innovative minds are working on our most pressing defense problems. A strong research program can also lower procurement costs by reducing technical risks and increasing reliability and performance. Renewing DARPA (the Defense Advanced Research Projects Agency) will be a key part of this strategy.

My administration will build a strong and more productive research program in the Department of Homeland Security (DHS) that will include critical work on cyber and bio security. Because existing programs have been plagued by management problems, we will bring a renewal of talent, organization, and focus, seeking support from our universities, companies, and labs. Another

critical role for R&D in national security is energy. Our petroleum dependence continually threatens our security, and my proposals for accelerating new alternative energy technologies will be an important part of my national security R&D agenda.

Finally, we will act to reverse the erosion of the U.S. manufacturing base - which could jeopardize our technical superiority. We need to continue to develop the finest defense systems in the world. But, we are losing domestic production capability for critical defense components and systems. I will implement the recommendations of the Defense Science Board on defense manufacturing, strengthen efforts at DoD's Manufacturing Technology program, and invest in innovative manufacturing sciences and processes to cut manufacturing costs and increase efficiency.

6. Pandemics and Biosecurity. Some estimates suggest that if H5N1 Avian Flu becomes a pandemic it could kill more than 300 million people. In an era of constant and rapid international travel, what steps should the United States take to protect our population from global pandemics or deliberate biological attacks?

It's time for a comprehensive effort to tackle bio-terror. We know that the successful deployment of a biological weapon—whether it is sprayed into our cities or spread through our food supply—could kill tens of thousands of Americans and deal a crushing blow to our economy.

Overseas, I will launch a Shared Security Partnership that invests \$5 billion over 3 years to forge an international intelligence and law enforcement infrastructure to take down terrorist networks. I will also strengthen U.S. intelligence collection overseas to identify and interdict would-be bioterrorists before they strike and expand the U.S. government's bioforensics program for tracking the source of any biological weapon. I will work with the international community to make any use of disease as a weapon declared a crime against humanity.

And to ensure our country is prepared should such an event occur, we must provide our public health system across the country with the surge capacity to confront a crisis and improve our ability to cope with infectious diseases. I will invest in new vaccines and technology to detect attacks and to trace them to their origin, so that we can react in a timely fashion. I have pledged to invest \$10 billion per year over the next 5 years in electronic health information systems to not only improve routine health care, but also ensure that these systems will give health officials the crucial information they need to deploy resources and save lives in an emergency. I will help hospitals form collaborative networks to

deal with sudden surges in patients and will ensure that the U.S. has adequate supplies of medicines, vaccines, and diagnostic tests and can get these vital products into the hands of those who need them.

We also have to expand local and state programs to ensure that they have the resources to respond to these disasters. I will work to strengthen the federal government's partnership with local and state governments on these issues by improving the mechanisms for clear communication, eliminating redundant programs, and building on the key strengths possessed by each level of government. I introduced legislation which would have provided funding for programs in order to enhance emergency care systems throughout the country.

I will build on America's unparalleled talent and advantage in STEM fields and the powerful insights into biological systems that are emerging to create new drugs, vaccines, and diagnostic tests and to manufacture these vital products much more quickly and efficiently than is now possible. Unfortunately, the Bush administration has failed to take full advantage of the Bioshield initiative. Because of the unpredictability of the mode of biological attack, I will stress the need for broad-gauged vaccines and drugs and for more agile and responsive drug development and production systems. This effort will strengthen the U.S. biotech and pharmaceutical industry and create high-wage jobs.

7. Genetics research. The field of genetics has the potential to improve human health and nutrition, but many people are concerned about the effects of genetic modification both in humans and in agriculture. What is the right policy balance between the benefits of genetic advances and their potential risks?

The progress that has occurred in genetics over the past half century has been remarkable—from the discovery of DNA's double helix structure in 1953 to the recent deciphering of all three billion letters of the human genome. New knowledge about genes is already transforming medicine and agriculture and has the potential to change other fields, including energy and environmental sciences and information technology.

I also recognize that the power of modern genetics has raised important ethical, legal, and social issues that require careful study. For example, new developments in human genetics allow individuals to be informed about their risks of various diseases; such information can be useful for diagnosing and treating disease, but it can also be misused by employers or insurers to discriminate. For this reason, I have been a long-time supporter of the recently passed Genetic Information Non-Discrimination Act. In addition, concerned

about the premature introduction of genetic testing into the public domain without appropriate oversight, I introduced the Genomics and Personalized Medicine Act of 2007 aimed at ensuring the safety and accuracy of such testing.

Advances in the genetic engineering of plants have provided enormous benefits to American farmers. I believe that we can continue to modify plants safely with new genetic methods, abetted by stringent tests for environmental and health effects and by stronger regulatory oversight guided by the best available scientific advice.

Disease treatment and identification is likewise being transformed by modern genetics. Recombinant DNA (rDNA) technology has produced a number of products such as human growth hormone or insulin or other complicated proteins that are known to be involved in bone metabolism, immune response, and tissue repair. The promise of rDNA is its ability to sidestep potentially harmful intermediaries that could have a pathogenic effect. Some forms of gene therapy-replacing faulty genes with functional copies-in comparison have encountered safety issues that arise from how the functional gene is delivered. As a result, the NIH established the Recombinant DNA Advisory Committee, which now provides advice and guidance on human gene therapy as well as other ethical concerns or potential abuse of rDNA technology. **Until we are equipped to ascertain the safety of such methods, I will continue to support the activities and recommendations of the Recombinant DNA Advisory Committee.**

8. Stem cells. Stem cell research advocates say it may successfully lead to treatments for many chronic diseases and injuries, saving lives, but opponents argue that using embryos as a source for stem cells destroys human life. What is your position on government regulation and funding of stem cell research?

Stem cell research holds the promise of improving our lives in at least three ways—by substituting normal cells for damaged cells to treat diabetes, Parkinson's disease, spinal cord injury, heart failure and other disorders; by providing scientists with safe and convenient models of disease for drug development; and by helping to understand fundamental aspects of normal development and cell dysfunction.

For these reasons, I strongly support expanding research on stem cells. I believe that the restrictions that President Bush has placed on funding of human embryonic stem cell research have handcuffed our scientists and hindered our ability to compete with other nations. **As president, I will lift the current**

administration's ban on federal funding of research on embryonic stem cell lines created after August 9, 2001 through executive order, and I will ensure that all research on stem cells is conducted ethically and with rigorous oversight.

I recognize that some people object to government support of research that requires cells to be harvested from human embryos. However, hundreds of thousands of embryos stored in the U.S. in in-vitro fertilization clinics will not be used for reproductive purposes, and will eventually be destroyed. I believe that it is ethical to use these extra embryos for research that could save lives when they are freely donated for that express purpose.

I am also aware that there have been suggestions that human stem cells of various types, derived from sources other than embryos, make the use of embryonic stem cells unnecessary. I don't agree. While adult stem cells, such as those harvested from blood or bone marrow, are already used for treatment of some diseases, they do not have the versatility of embryonic stem cells and cannot replace them. Recent discoveries indicate that adult skin cells can be reprogrammed to behave like stem cells; these are exciting findings that might in the future lead to an alternate source of highly versatile stem cells. However, embryonic stem cells remain the "gold standard," and studies of all types of stem cells should continue in parallel for the foreseeable future.

Rather than restrict the funding of such research, I favor responsible oversight of it, in accord with recent reports from the National Research Council. Recommendations from the NRC reports are already being followed by institutions that conduct human embryonic stem cell research with funds from a variety of sources. An expanded, federally-supported stem cell research program will encourage talented U.S. scientists to engage in this important new field, will allow more effective oversight, and will signal to other countries our commitment to compete in this exciting area of medical research.

9. Ocean Health. Scientists estimate that some 75 percent of the world's fisheries are in serious decline and habitats around the world like coral reefs are seriously threatened. What steps, if any, should the United States take during your presidency to protect ocean health?

Oceans are crucial to the earth's ecosystem and to all Americans because they drive global weather patterns, feed our people and are a major source of employment for fisheries and recreation. As president, I will commit my administration to develop the kind of strong, integrated, well-managed program of ocean stewardship that is essential to sustain a healthy marine environment.

Global climate change could have catastrophic effects on ocean ecologies. Protection of the oceans is one of the many reasons I have developed an ambitious plan to reduce U.S. emissions of greenhouse gases 80 percent below 1990 by 2050. We need to enhance our understanding of the effect of climate change on oceans and the effect of acidification on marine life through expanded research programs at NASA, the National Oceanic and Atmospheric Administration (NOAA), the National Science Foundation (NSF), and the U.S. Geological Survey (USGS). I will propel the U.S. into a leadership position in marine stewardship and climate change research. Stronger collaboration across U.S. scientific agencies and internationally is needed in basic research and for designing mitigation strategies to reverse or offset the damage being done to oceans and coastal areas.

The oceans are a global resource and a global responsibility for which the U.S. can and should take a more active role. I will work actively to ensure that the U.S. ratifies the Law of the Sea Convention – an agreement supported by more than 150 countries that will protect our economic and security interests while providing an important international collaboration to protect the oceans and its resources. My administration will also strengthen regional and bilateral research and oceans preservation efforts with other Gulf Coast nations.

Our coastal areas and beaches are American treasures and are among our favorite places to live and visit. I will work to reauthorize the Coastal Zone Management Act in ways that strengthen the collaboration between federal agencies and state and local organizations. The National Marine Sanctuaries and the Oceans and Human Health Acts provide essential protection for ocean resources and support the research needed to implement a comprehensive ocean policy. These programs will be strengthened and reauthorized.

10. Water. Thirty-nine states expect some level of water shortage over the next decade, and scientific studies suggest that a majority of our water resources are at risk. What policies would you support to meet demand for water resources?

Solutions to this critical problem will require close collaboration between federal, state, and local governments and the people and businesses affected. First, prices and policies must be set in a ways that give everyone a clear incentive to use water efficiently and avoid waste. Regulations affecting water use in appliances and incentives to shift from irrigated lawns to "water smart" landscapes are examples. Second, information, training, and, in some cases, economic assistance should be provided to farms and businesses that will need to shift to more efficient water practices. Many communities are offering kits to

help businesses and homeowners audit their water use and find ways to reduce use. These should be evaluated, with the most successful programs expanded to other states and regions. I will establish a national plan to help high-growth regions with the challenges of managing their water supplies.

In addition, it is also critical that we undertake a concerted program of research, development, and testing of new technologies that can reduce water use.

11. Space. The study of Earth from space can yield important information about climate change; focus on the cosmos can advance our understanding of the universe; and manned space travel can help us inspire new generations of youth to go into science. Can we afford all of them? How would you prioritize space in your administration?

As president, I will establish a robust and balanced civilian space program. Under my administration, NASA not only will inspire the world with both human and robotic space exploration, but also will again lead in confronting the challenges we face here on Earth, including global climate change, energy independence, and aeronautics research. In achieving this vision, I will reach out to include international partners and to engage the private sector to amplify NASA's reach. I believe that a revitalized NASA can help America maintain its innovation edge and contribute to American economic growth.

There is currently no organizational authority in the federal government with a sufficiently broad mandate to oversee a comprehensive and integrated strategy and policy dealing with all aspects of the government's space-related programs, including those being managed by NASA, the Department of Defense, the National Reconnaissance Office, the Department of Commerce, the Department of Transportation, and other federal agencies. This wasn't always the case. Between 1958 and 1973, the National Aeronautics and Space Council oversaw the entire space arena for four presidents; the Council was briefly revived from 1989 to 1992. I will re-establish this Council reporting to the president. It will oversee and coordinate civilian, military, commercial, and national security space activities. It will solicit public participation, engage the international community, and work toward a 21st century vision of space that constantly pushes the envelope on new technologies as it pursues a balanced national portfolio that expands our reach into the heavens and improves life here on Earth.

12. Scientific Integrity. Many government scientists report political interference in their job. Is it acceptable for elected officials to hold back or alter scientific reports if they conflict with their own views, and how will you balance scientific information with politics and personal beliefs in your decision-making?

Scientific and technological information is of growing importance to a range of issues. I believe such information must be expert and uncolored by ideology.

I will restore the basic principle that government decisions should be based on the best- available, scientifically-valid evidence and not on the ideological predispositions of agency officials or political appointees. More broadly, I am committed to creating a transparent and connected democracy, using cutting-edge technologies to provide a new level of transparency, accountability, and participation for America's citizens. Policies must be determined using a process that builds on the long tradition of open debate that has characterized progress in science, including review by individuals who might bring new information or contrasting views. I have already established an impressive team of science advisors, including several Nobel Laureates, who are helping me to shape a robust science agenda for my administration.

In addition I will:

- Appoint individuals with strong science and technology backgrounds and unquestioned reputations for integrity and objectivity to the growing number of senior management positions where decisions must incorporate science and technology advice. These positions will be filled promptly with ethical, highly qualified individuals on a non-partisan basis;
- Establish the nation's first Chief Technology Officer (CTO) to ensure that our government and all its agencies have the right infrastructure, policies and services for the 21st century. The CTO will lead an interagency effort on best-in-class technologies, sharing of best practices, and safeguarding of our networks;
- Strengthen the role of the President's Council of Advisors on Science and Technology (PCAST) by appointing experts who are charged to provide independent advice on critical issues of science and technology. The PCAST will once again be advisory to the president; and
- Restore the science integrity of government and restore transparency of decision- making by issuing an Executive Order establishing clear guidelines for the review and release of government publications, guaranteeing that results are released in a timely manner and not distorted by the ideological biases of political appointees. I will

strengthen protection for “whistle blowers” who report abuses of these processes

13. Research. For many years, Congress has recognized the importance of science and engineering research to realizing our national goals. Given that the next Congress will likely face spending constraints, what priority would you give to investment in basic research in upcoming budgets?

Federally supported basic research, aimed at understanding many features of nature—from the size of the universe to subatomic particles, from the chemical reactions that support a living cell to interactions that sustain ecosystems—has been an essential feature of American life for over fifty years. While the outcomes of specific projects are never predictable, basic research has been a reliable source of new knowledge that has fueled important developments in fields ranging from telecommunications to medicine, yielding remarkable rates of economic return and ensuring American leadership in industry, military power, and higher education. I believe that continued investment in fundamental research is essential for ensuring healthier lives, better sources of energy, superior military capacity, and high-wage jobs for our nation’s future.

Yet, today, we are clearly under-investing in research across the spectrum of scientific and engineering disciplines. Federal support for the physical sciences and engineering has been declining as a fraction of GDP for decades, and, after a period of growth of the life sciences, the NIH budget has been steadily losing buying power for the past six years. As a result, our science agencies are often able to support no more than one in ten proposals that they receive, arresting the careers of our young scientists and blocking our ability to pursue many remarkable recent advances. Furthermore, in this environment, scientists are less likely to pursue the risky research that may lead to the most important breakthroughs. Finally, we are reducing support for science at a time when many other nations are increasing it, a situation that already threatens our leadership in many critical areas of science.

This situation is unacceptable. As president, I will increase funding for basic research in physical and life sciences, mathematics, and engineering at a rate that would double basic research budgets over the next decade.

Sustained and predictable increases in research funding will allow the United States to accomplish a great deal. First, we can expand the frontiers of human knowledge. Second, we can provide greater support for high-risk, high-return research and for young scientists at the beginning of their careers. Third, we can harness science and technology to address the “grand challenges” of the 21st

century: energy, health, food and water, national security, information technology, and manufacturing capacity.

14. Health. Americans are increasingly concerned with the cost, quality and availability of health care. How do you see science, research and technology contributing to improved health and quality of life?

Americans have good reasons to be proud of the extraordinary role that medical science has had in combating disease, here and throughout the world, over the past century. Work sponsored by the National Institutes of Health (NIH), other government agencies, and our pharmaceutical and biotechnology industries has produced many vaccines, drugs, and hormones that have improved the quality of life, extended life expectancy, and reduced the dire consequences of many serious illnesses and disabilities. These advances include methods for preventing and treating coronary artery disease and stroke, which have reduced mortality rates by two-thirds; new drugs and antibodies that allow us to effectively treat certain cancers; anti-viral agents that allow most patients with AIDS to control their disease; drugs that often help make severe psychiatric illnesses manageable; and new vaccines that are reducing the incidence of virus-related cancers; and minimally invasive surgery techniques that reduce hospitalizations, complications, and costs. We can expect much more from the exciting biomedical research now underway. For example, we can foresee medical care that will allow physicians to tailor care to individual patients, matching therapies to those most likely to benefit.

However, today our citizens have understandable concerns about their ability to afford the care they need, especially when our underlying system of paying for health care is broken. We spend more on health care per capita than people of other countries, yet lower income groups continue to suffer significant disparities in both access to care and health outcomes. Without major changes, costs will continue to increase. Our population is aging, many cancers and chronic disorders remain difficult to treat, and there are continuing threats of new and re-emerging infectious diseases.

It's wrong that America's health care system works better for insurance and drug companies than it does for average Americans, who face skyrocketing health care costs. My plan makes health care more secure and affordable by strengthening employer-based coverage, protecting patients' ability to choose their own doctors, and saving families \$2,500 dollars by requiring insurance companies to cover prevention and limiting excessive insurance company charges. My plan covers everybody by requiring insurance companies to cover

pre-existing conditions, providing tax credits to small businesses and working families, and covering all uninsured children.

These are difficult problems, and science and technology can solve only some of them. The effectiveness of medical care can be improved, and its costs can be reduced, by greater emphasis on best practices, electronic medical records, hospital safety, preventive strategies, and improved public health surveillance. The increased investments I support for medical research at the NIH may yield discoveries that reduce the cost of drug development, and we may produce new methods to prevent diseases that are costly to treat. But efforts to control costs also should make greater use of the tools for prevention and clinical management that already exist; enlist more effective participation of the Centers for Disease Control (CDC) and the Food and Drug Administration (FDA), as well as the NIH; and encourage investments in healthcare and health research by the private and not-for-profit sectors.

Overall, I am committed to three major tasks that will be necessary to confront widespread concerns about the nation's health: provision of healthcare plans to all of our citizens; comprehensive efforts to make our health care system more cost-efficient; and continued biomedical research to understand diseases more thoroughly and find better ways to prevent and treat them.