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Broad Federal Effort Urgently Needed to Create New, High-Quality Jobs in the United States

The U.S. National Academies recently released a report calling for a comprehensive and coordinated federal effort to bolster U.S. competitiveness in order to enable the country to consistently gain from the opportunities offered by rapid globalization. The ultimate goal, said the study committee, is to create new, high-quality jobs by developing new industries that stem from the ideas of exceptional scientists and engineers.

The congressionally requested report—written by a 20-member committee that included university presidents, CEOs, Nobel Laureates, and former presidential appointees, and chaired by Norman R. Augustine, retired chair and CEO of Lockheed Martin Corp. (Bethesda, Md.)—makes four recommendations along with 20 implementation actions that federal policymakers should take to create high-quality jobs and focus new science and technology (S&T) efforts on meeting the country's need for clean, affordable, and reliable energy. Some actions will involve changing existing laws, while others will require financial support that would come from reallocating existing budgets or increasing them. The committee said that ongoing evaluation of the results should be included in all of the measures.

The report, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, recommends that policymakers increase the national investment in basic research by 10% each year over the next seven years. Special attention should be paid to the physical

sciences, engineering, mathematics, and the information sciences, and to basic research funding for the U.S. Department of Defense, the report said. It also said that policymakers should establish within the U.S. Department of Energy an organization called the Advanced Research Project Agency—Energy (ARPA-E) that reports to the undersecretary for science and sponsors “out-of-the-box” energy research to meet the country's long-term energy challenges. Authorities should make 200 new research grants annually—worth \$500,000 each, payable over five years—to the nation's most outstanding early-career researchers, the report said.

In its call for innovation, the report said that policymakers should provide tax incentives for innovation based in the United States. The Council of Economic Advisers and the Congressional Budget Office should conduct a comprehensive analysis to examine how the United States compares globally as a location for innovation and related activities, with the goal of ensuring that the States is one of the most attractive places in the world for long-term investment in such efforts. The Research and Experimentation Tax Credit is currently available to companies. To encourage private investment in innovation, this credit should be made permanent, and Congress should increase the allowable credit from 20% to 40% of qualifying R&D investments, according to the recommendations of the report.

In the area of education, the United States should be considered the most attractive setting internationally to study and conduct research, the report said. Each year, policymakers should provide

25,000 new, competitive four-year undergraduate scholarships and 5,000 new graduate fellowships to U.S. citizens enrolled in physical science, life science, engineering, and mathematics programs at U.S. colleges and universities. Policymakers should also provide a one-year automatic visa extension that allows international students to remain in the United States to seek employment if they have received doctorate degrees or the equivalent in science, technology, engineering, mathematics, or other fields of national need from qualified U.S. institutions. If these students then receive job offers from U.S.-based employers and pass a security screening test, they should automatically get work permits and expedited residence status. If they cannot obtain employment within one year, their visas should expire, the report recommends.

The committee also seeks to increase the U.S. talent pool by vastly improving K–12 mathematics and science education. One suggestion is to create a merit-based scholarship program to attract 10,000 exceptional students to math and science teaching careers each year. Four-year scholarships, worth up to \$20,000 annually, should be designed to help some of the country's top students obtain bachelor's degrees in physical or life sciences, engineering, or mathematics—with concurrent certification as K–12 math and science teachers. After graduation, they would be required to work for at least five years in public schools. Participants who teach in disadvantaged inner-city or rural areas would receive a \$10,000 annual bonus. Each of the 10,000 teachers would serve about 1,000 students over the course of a teaching career, having an impact on 10 million students, the report said.

The study was sponsored by the National Academies, which comprise the National Academy of Sciences, the National Academy of Engineering, the Institute of Medicine, and the National Research Council. They are private, nonprofit institutions that provide science, technology, and health policy advice under a congressional charter.

Copies of the report are available from the National Academies Press; tel. 202-334-3313 or 1-800-624-6242, or on the Internet at www.nap.edu.

U.K. Energy Minister to Address Energy Review

U.K. Energy Minister Malcolm Wicks has admitted that tough decisions—including the nuclear option—have to be made after he was asked, last fall, to lead a review of U.K. energy policy. Prime Minister Tony Blair and Trade and

DHS Provides Visa Waiver Program Report to Congress

The U.S. Department of Homeland Security (DHS) announced last November the completion of a status report on countries participating in the Visa Waiver Program (VWP) as required by the Enhanced Border Security and Visa Entry Reform Act of 2002. As a result of this review, 25 of the 27 participating countries will maintain their current enrollment status in the VWP. Recently announced requirements for VWP countries regarding digital photos, passports, and e-passports are separate from this country review process. Comprehensive reviews of Italy and Portugal are on a different time schedule, and the results of those reviews will be released at a later time.

In order to participate in the VWP, countries must satisfy a number of congressional requirements, including visa-free privileges for visiting U.S. citizens, a low number of immigration violations, and high passport security standards to protect against the fraudulent use of travel documents. As required by Congress, DHS must carry out reviews of participating countries every two years to determine the effect that each country's continued participation in the VWP has on U.S. security, immigration, and general law enforcement interests.

The 27 countries participating in the VWP are Andorra, Australia, Austria, Belgium, Brunei, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Japan, Liechtenstein, Luxembourg, Monaco, the Netherlands, New Zealand, Norway, Portugal, San Marino, Singapore, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

Industry Secretary Alan Johnson have asked Wicks to lead the review and bring forward policy proposals in 2006.

According to the Department of Trade and Industry (DTI), the review will look at energy supply and demand and focus on policy measures to help the government deliver its objectives beyond 2010. The review will aim to ensure that the United Kingdom is on track to meet the goals of the 2003 Energy White Paper in the medium and long term, according to the DTI.

Wicks said, "The energy review is taking place against a background of strengthening evidence on the nature and extent of climate change and increasing concerns about the future security of U.K. energy supplies. This is the right moment to assess where we are in relation to achieving the goals set out in the 2003 Energy White Paper.

"The review will explore all the options open to us, taking into account the important international context. There will inevitably be some difficult decisions and tradeoffs to be made in arriving at the right package of policy proposals. It is crucial that we stimulate a wide-ranging and informed debate and engage the public, business, and industry throughout the process as well as academic, private sector, scientific, NGO [non-governmental organization], and other experts."

The review will be taken forward by a cross-departmental team based at DTI, with officials drawn from key relevant departments and the prime minister's Strategy Unit.

A formal consultation phase will start near the beginning of 2006. The consultation will be launched with a statement of current evidence on the White Paper goals and the government's plans for engagement with the public and stakeholders.

The review will assess progress against the four goals set by the 2003 Energy White Paper:

- To put the United Kingdom on a path to cut its carbon dioxide emissions by ~60% by ~2050 with real progress by 2020;
- To maintain the reliability of energy supplies;
- To promote competitive markets in the United Kingdom and beyond, helping to raise the rate of sustainable economic growth and to improve productivity; and
- To ensure that every home is adequately and affordably heated.

Wicks said, "There is not a single solution and it is not a choice of nuclear versus renewables. In looking at the nuclear option, there are a number of key factors

such as the economics, safety, and nuclear waste. For too long, governments have dodged the issue of what to do with nuclear waste. Now we have to make decisions quickly because we have an urgent timetable. By next summer, we expect to present the prime minister with judgments about the future of energy policy."

The review team will work closely with the Stern Review team, who are looking at the economics of climate change, in a wider global context. Stern is head of the Government Economic Service, and was appointed last October as advisor to the government on the economics of climate change and development. He was charged to lead a major review of the economics of climate change, to understand more comprehensively the nature of the economic challenges and how they can be met, in the United Kingdom and globally. More information about the Stern Review can be accessed at www.sternreview.org.uk.

India Presented with National Hydrogen Energy Roadmap

The Indian minister for non-conventional energy sources, Vilas Muttemwar, has called upon all stakeholders to join hands with the government in the implementation of the National Hydrogen Energy Roadmap. He received the roadmap document last fall, as prepared by the Steering Group on Hydrogen Energy, chaired by Ratan N. Tata. Muttemwar said the roadmap would put India in the forefront of the new global hydrogen energy economy and provide sustainable energy security to all citizens in the coming years. He said that the urgency of making the transition to the hydrogen energy economy from the present hydrocarbon energy economy has been recognized globally, and large-scale efforts are in progress not only in the advanced countries but also in developing countries like India, China, and Brazil. The minister said that India is poised to be on the leading edge of hydrogen energy technologies because the country is uniquely endowed with a strong science and technology base and advanced industrial infrastructure.

Upon presenting the roadmap to the minister, Tata said that the roadmap for a hydrogen economy would provide a clean, reliable, sustainable, and alterna-

tive energy source for the country's growing energy needs.

The roadmap discusses different aspects of hydrogen energy, which include production, storage, transport, delivery, applications, safety, standards and codes, capacity building, and awareness. The roadmap has highlighted new methods of hydrogen production as a key area of focus in addition to existing methods of hydrogen production based on steam methane reformation. Production of hydrogen from coal gasification, nuclear energy, biomass, biological, and renewable energy methods needs to be developed urgently, according to the steering committee. In the area of hydrogen storage, which includes gaseous, liquid, and solid-state storage, various goals to be achieved by 2020 concerning efficiency of storage, useful cycle life, compactness, and cost have been identified in the roadmap.

The roadmap proposes two major initiatives: namely, the Green Initiative for Future Transport (GIFT) and the Green Initiative for Power Generation (GIP). The GIFT aims to develop and demonstrate hydrogen-powered internal combustion (IC) engine and fuel-cell-based vehicles ranging from small two- or three-wheeled cars/taxis, buses, and vans through different phases of development. It is envisaged that if the National Hydrogen Energy Roadmap is implemented as proposed, one million hydrogen-fueled vehicles would be on Indian roads by 2020. The GIP envisages developing and demonstrating hydrogen-powered IC engine/ turbine and fuel-cell-based decentralized power generating systems. It is envisaged in the roadmap that decentralized hydrogen-based power generation of about 1000 MW aggregate capacity would be set up in the country by 2020.

The roadmap breaks down projected costs for research, development, and demonstration and for creating an infrastructure for hydrogen production, storage, transportation, and distribution in order to meet the requirements for hydrogen under the GIFT and GIP initiatives. The roadmap recommends strong public-private partnerships covering the total hydrogen energy system for the implementation of its proposals. □

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