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WATER SUPPLY TECHNOLOGY PROGRAM ACT OF 2005

DECEMBER 8, 2005.—Ordered to be printed

Filed under authority of the order of November 18, 2005

Mr. DOMENICI, from the Committee on Energy and Natural Resources, submitted the following

R E P O R T

[To accompany S. 1860]

The Committee on Energy and Natural Resources, to which was referred the bill (S. 1860) to amend the Energy Policy Act of 2005 to improve energy production and reduce energy demand through improved use of reclaimed waters, and for other purposes, having considered the same, reports favorably thereon with an amendment and an amendment to the title and recommends that the bill, as amended, do pass.

The amendments are as follows:

1. Strike out all after the enacting clause and insert in lieu thereof the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "Water Supply Technology Program Act of 2005".

SEC. 2. DEFINITIONS.

In this Act:

(1) ADVISORY PANEL.—The term "Advisory Panel" means the Water Supply Technology Advisory Panel established under section 3(d).

(2) PROGRAM.—The term "program" means the water supply technology research, development, demonstration, and commercial application program established under section 3(a).

(3) SECRETARY.—The term "Secretary" means the Secretary of Energy.

(4) WATER AGENCY.—The term "water agency" means any State, instrumentality of a State, municipality, political subdivision, authority, utility, district, association, or other entity that provides water for public use.

(5) WATER SUPPLY TECHNOLOGY.—The term "water supply technology" means—

(A) technologies for—

(i) desalination and associated concentrate disposal;

(ii) water reuse and recycling;

(iii) removing contaminants from water, including impaired water produced as a result of energy production activities;

(iv) reducing the amount of energy required to provide adequate water supplies;

(v) water use efficiency and conservation; and

(vi) water monitoring and systems analysis; and

(B) any other technologies identified by the Secretary as appropriate to carry out the program.

SEC. 3. WATER SUPPLY TECHNOLOGY RESEARCH, DEVELOPMENT, DEMONSTRATION, AND COMMERCIAL APPLICATION PROGRAM.

(a) ESTABLISHMENT.—In accordance with this Act, the Secretary shall establish a national program for the research, development, demonstration, and commercial application of economically viable and cost-effective water supply technologies to—

(1) increase the amount of water available for human use;

(2) facilitate the widespread commercialization of newly developed water supply technologies for use in real-world applications, including the conduct of an assessment of economic and other market-related factors relating to the introduction and adoption of water supply technologies in practical applications;

(3) facilitate collaboration among Federal agencies to provide for the integration of research on, and the development, demonstration, and commercial application of, water supply technologies; and

(4) reclaim and improve access to previously unusable and nontraditional water resources.

(b) OTHER AGREEMENTS.—The Secretary may enter into any grant, contract, cooperative agreement, interagency agreement, or other transaction, as the Secretary determines to be necessary to carry out this Act.

(c) PROGRAM LEAD LABORATORY.—

(1) IN GENERAL.—The Secretary shall designate 1 or more lead National Laboratories to carry out water supply technology research, development, demonstration, and commercial application activities under the program.

(2) CONSIDERATIONS.—In determining the number of lead laboratories to designate under paragraph (1), the Secretary shall consider the amount of appropriations available to carry out the program.

(3) SELECTION OF UNIVERSITY AND WATER AGENCY PARTNERS.—Each lead laboratory designated under paragraph (1), in consultation with the Advisory Panel, shall select at least 1 university partner and at least 1 water agency partner to assist the lead laboratory in carrying out the program.

(d) ADVISORY PANEL.—

(1) IN GENERAL.—The Secretary shall establish an advisory panel, to be known as the "Water Supply Technology Advisory Panel", to advise the Secretary on the activities carried out under this Act.

(2) MEMBERSHIP.—Members of the Advisory Panel shall—

(A) have expertise in—

(i) water supply technology; or

(ii) legal or regulatory issues associated with adopting water supply technologies in real-world applications; and

(B) be representative of institutions of higher education, industry, State and local governments, international water supply technology institutions, Federal agencies, and nongovernmental organizations.

(3) DUTIES.—The Advisory Panel shall—

(A) periodically assess the performance of water supply technology research, development, demonstration, and commercial application activities being carried out under this Act;

(B) advise the Secretary on research priorities to be carried out under this Act;

(C) make recommendations to the Secretary for awarding research grants and demonstration project grants; and

(D) identify legal, policy, or regulatory barriers to implementing water supply technologies in real-world applications.

(e) WATER SUPPLY TECHNOLOGY ASSESSMENT.—

(1) IN GENERAL.—In consultation with the Secretary of Agriculture, the Administrator of the Environmental Protection Agency, the Secretary of Defense, the Administrator of the National Aeronautics and Space Administration, the Director of the National Science Foundation, the Secretary of the Interior, the Director of the Office of Management and Budget, the Director of the Office of Science and Technology Policy, and the heads of other appropriate Federal agencies, the Secretary, shall—

(A) assess the annual amount of Federal funding levels and authorizations for water supply technology research;

(B) assess the scope of the water supply technology research performed by other agencies; and

(C) assess whether and to what extent Federal water supply technology research is duplicative.

"(2) TECHNOLOGY ROADMAP.—In consultation with the Secretary of Agriculture, the Administrator of the Environmental Protection Agency, the Secretary of Defense, the Administrator of the National Aeronautics and Space Administration, the Director of the National Science Foundation, the Secretary of the Interior, the Director of the Office of Science and Technology Policy, the heads of other appropriate Federal agencies, the Advisory Panel, and any lead laboratories designated under subsection (d)(I), the Secretary, shall—

(A) assess any water supply technology research being performed;

(B) identify water supply technology research and development priorities; and

(C) develop a technology roadmap to identify critical water supply technology research, development, demonstration, and commercial application activities to guide program activities.

(3) REPORT.—Not later than 18 months after the date of enactment of this Act, the Secretary shall submit to the Committee on Energy and Natural Resources of the Senate, the Committee on Resources of the House of Representatives, and the Committee on Energy and Commerce of the House of Representatives a detailed report on—

(A) the assessments conducted under paragraphs (1) and (2); and

(B) the technology roadmap developed under paragraph (2)(C).

(f) PROGRAM GRANTS.—

(1) IN GENERAL.—The Secretary shall provide competitive grants to entities with expertise in the conduct of water supply technology research, development, and demonstration projects.

(2) REQUIREMENTS.—The grants under paragraph (1) shall be provided consistent with the technology roadmap developed under subsection (e)(2)(C).

(3) LIMITATION.—Of amounts made available for grants under section 4(b)(2), not more than 25 percent shall be provided to National Laboratories and Federal agencies.

(4) CRITERIA.—The Secretary shall establish criteria for the submission and review of grant applications and the provision of grants under paragraph (1).

(g) PROGRAM REVIEW.—

(1) IN GENERAL.—The Secretary shall establish an independent third party review process to conduct periodic peer reviews of the program.

(2) REQUIREMENTS.—In conducting a review under paragraph (1), an independent third party reviewer shall—

(A) review the technology roadmap, technical milestones, and plans for commercial application developed under the program; and

(B) assess the progress of the program in achieving the technical milestones and plans for commercial application.

(h) REPORT TO CONGRESS.—Not later than 3 years after the date of enactment of this Act and each year thereafter, the Secretary shall submit to the Committee on Energy and Natural Resources of the Senate, the Committee on Resources of the House of Representatives, and the Committee on Energy and Commerce of the House of Representatives a report that describes the activities carried out under this Act, including the activities carried out under subsection (d)(3).

(i) COST-SHARING REQUIREMENT.—Any activities carried out under this Act shall be subject to section 988 of the Energy Policy Act of 2005 (42 U.S.C. 16352).

SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

(a) IN GENERAL.—There are authorized to be appropriated to the Secretary to carry out this Act, including the completion of the roadmap under section 3(e)(2)(C)—

(1) $5,000,000 for fiscal year 2006; and

(2) such sums as are necessary for each fiscal year thereafter.

(b) ALLOCATION.—Of amounts made available under subsection (a) for fiscal year 2007 and each fiscal year thereafter—

(1) not more than 24 percent shall be made available to the 1 or more lead laboratories designated under section 3(c)(1), to be distributed equally between the lead laboratories if more than 1 lead laboratory is designated, for the conduct of activities under the program (including to carry out section 3(a)(2));

(2) at least 60 percent shall be made available for program grants under section 3(f), of which 20 percent, or as the Secretary determines to be appropriate, a higher percentage, shall be made available for demonstration projects; and

(3) not more than 15 percent shall be used to pay the administrative costs of carrying out the program, including costs to support the activities of the Advisory Panel.

2. Amend the title so as to read: "To establish a program for the research, development, demonstration, and commercial application of water supply technologies, and for other purposes".

PURPOSE OF MEASURE

The purpose of S. 1860 is to establish a program for the research, development, demonstration, and commercial application of water supply technologies.

BACKGROUND AND NEED

Water shortages impair the production of energy and conversely, energy shortages impair the ability to provide adequate water supplies. A 2005 report by the Multi-Laboratory Energy-Water Nexus Committee, a consortium of twelve national laboratories, found "insufficient supplies of water can cripple energy production...insufficient or too costly energy can cripple water supplies." Electricity production is entirely dependent on the availability of water, regardless of fuel source. Additionally, the vast majority of energy fuel production and processing is entirely dependent on having adequate access to water. For example, Sandia National Laboratories estimates that for every barrel of oil produced, ten gallons of water are required. Similarly, the transportation, distribution, acquisition and purification of water require large amounts of energy. Pumping and treating water for municipal and industrial uses account for two to three percent of the world's energy consumption. Water availability and energy production are inextricably linked. For this reason, water shortages have the potential to impair energy production.

Water shortages are anticipated domestically. A study by the Governmental Accountability Office states that "water managers in thirty-six States anticipate shortages in localities, regions, or Statewide in the next ten years." The competing demands of energy production, population growth, drought, agricultural needs, environmental needs, and tribal interests in the West have resulted in a paucity of available water. In the States expected to grow most rapidly—Nevada, Texas, Arizona, Florida, California, and New Mexico—consumptive use already nears or exceeds available supply. Moreover, population growth in these regions shows no indication of abating. The U.S. Census Bureau recently estimated that by 2030, Nevada will have more than four million residents, twice as many as in 2000. The availability of water suitable for human use is also of great importance in the Eastern United States. Despite receiving substantially more rainfall than the Western United States, much of the east coast is facing water shortages. Boston, Atlanta, and much of Florida are nearing the end of readily available water.

A recent report released by the Center for Strategic and International Studies and Sandia National Laboratories states that during the 21st century water shortages will increasingly be the source of international conflict and have the potential to impair energy production capacity. "The expected rise in global population will drive a corresponding rise in demand for food, energy, and water

as well as tighten the interdependencies between the three. Such close linkages also give rise to an increasing possibility of political or economic upheavals stemming from a lack of any one of the key resources." Nearly 1.2 billion people, roughly one fifth of the world's population, currently live without reliable access to water. By 2030 it is estimated there will be an additional three billion people in the world. Finding new sources of water to meet this population growth will be an increasingly challenging international issue.

Federal water resources research has remained level at approximately $700 million in 2000 dollars since the mid-1970s. Funding for water supply augmentation research has dropped dramatically during the same period. Funding for water supply augmentation and conservation dropped from $64 million in 1973 (in 2000 dollars) to $14 million in 2000. In recent years, the Federal Government has invested approximately $130 billion in research and development activities. Of this expenditure, research related to water resources accounts for only 0.5 percent. Various sources call for a renewed Federal investment in water resources research to address water scarcity. The Multi-Laboratory Energy-Water Nexus Committee states that "it is time to reinvest in the research and technology development needed to provide the tools to ensure sustainable water supplies for energy, moving to less water-intensive electric generation sources, and reducing the amount of energy required to provide an adequate water supply." The Center for Strategic and International Studies and Sandia National Laboratories study identifies increased investment in water technology by developed nations as a way to avoid "instability or conflict related to water supplies." A report by the National Research Council found that "the nation's water resources research enterprise is not as well organized and financed as it will need to be if the science required to address the multiplying water problems confronting the United States is to be available."

LEGISLATIVE HISTORY

S. 1860 was introduced on October 7, 2005, by Senator Domenici for himself, and Senators Bingaman, Alexander, and Frist and was referred to the Committee on Energy and Natural Resources. Senators Feinstein and Salazar are also cosponsors. The full Committee held a hearing on S. 1860 on October 20, 2005. At the business meeting on November 16, 2005, the Committee on Energy and Natural Resources ordered S. 1860 favorably reported with an amendment in the nature of a substitute.

COMMITTEE RECOMMENDATION

The Senate Committee on Energy and Natural Resources, in an open business meeting on November 16, 2005, by unanimous voice vote of a quorum present, recommends that the Senate pass S. 1860, if amended as described herein.

COMMITTEE AMENDMENT

During consideration of S. 1860, the Committee adopted an amendment in the nature of a substitute which addresses concerns

raised during the committee hearing and in written submissions and an amendment to the title.

The substitute makes nine major changes in the bill as introduced. The first change removes the designation of Sandia, Lawrence Livermore and Oak Ridge National Laboratories as lead laboratories. The amendment instead directs the Secretary of Energy (hereinafter "Secretary") to designate the lead laboratory or lead laboratories and directs the Secretary to take into account the amount of appropriations made available to carry out the program in making their designation. The second change directs the lead laboratory or lead laboratories to each partner with a water agency to carry out the program. A definition of "water agency" was also added by the substitute amendment. The third change provides that the Secretary shall conduct the technology assessment and roadmap. As introduced, S. 1860 provided that the Secretary, acting though the National Laboratories would conduct the technology assessment and roadmap. The fourth change directs the Secretary to submit a report on the findings of the technology assessment and roadmap within 18 months. As introduced, S. 1860 required the Secretary to submit the report within 24 months. The fifth change directs the Secretary to establish an independent third party review of the activities carried out under the program. As introduced, S. 1860 provided that the National Academy of Science would carry out the review. The sixth change expressly provides that activities carried out under the Act shall be subject to the cost-sharing provisions of section 988 of the Energy Policy Act of 2005. The seventh change provides that not more than 25 percent of the funding would be provided to the lead laboratory or lead laboratories. As introduced, S. 1860 provided that at least 40 percent of the funding would be provided to the lead laboratory or lead laboratories. The eighth change provides that at least 60 percent of the funding would go to competitive grants. Of this amount, at least 20 percent shall be provided for demonstration projects. As introduced, S. 1860 provided that at least 40 percent of the funding would be provided for competitive grants, no percentage of funding was allocated for demonstration projects. The ninth change deletes the amendment to the Energy Policy Act of 2005 (Public Law 109–58), creating this Act as a new section 112 of the Energy Policy Act of 2005.

SECTION-BY-SECTION ANALYSIS

Section 1 provides the short title, the "Water Supply Technology Program Act of 2005."

Section 2 defines the terms used in the Act.

Section 3 subsection (a) directs the Secretary to establish a national program for the research, development, demonstration, and commercial application of economically viable and cost-effective water supply technologies to: increase the amount of water available for human use; facilitate the widespread commercialization of newly developed water supply technologies for use in real-world applications; facilitate collaboration among federal agencies in their water supply technology activities; and reclaim and improve access to previously unusable and nontraditional water sources.

Subsection (b) provides that the Secretary may enter into any grant, contract, agreement, or other transaction, as the Secretary determines necessary to carry out the Act.

Subsection (c) directs the Secretary to select one or more lead National Laboratory to carry out water supply technology research, development, demonstration, and commercial application activities under the program. The subsection also directs the Secretary to consider the amount of appropriations available to carry out the program in determining the number of lead laboratories to designate. The subsection also provides that each lead laboratory, in collaboration with the advisory panel, shall select at least one university partner and one water agency partner

Subsection (d) directs the Secretary to establish a "Water Supply Technology Advisory Panel" consisting of members that have expertise in water supply technology or legal or regulatory issues associated with adopting water supply technologies in real-world applications. The subsection provides that the advisory panel: assess the performance of the activities being carried out under the Act; advise the Secretary on research priorities; make recommendations to the Secretary for awarding grants; and identify legal, policy, or regulatory barriers to implementing water supply technologies.

Subsection (e) directs the Secretary, in collaboration with appropriate Federal agencies to: assess the amount of annual Federal authorizations and appropriations for water supply technology research; assess water supply technology research performed by other Federal agencies; and assess whether and to what extent the research is duplicative. The subsection also directs the Secretary, in collaboration with appropriate Federal agencies, the lead laboratory or lead laboratories and the advisory panel to: assess any water supply technology research being performed; identify research and development priorities; and develop a technology roadmap. The subsection directs the Secretary to submit a report on the activities carried out under this subsection within 18 months after the activities are completed.

Subsection (f) directs the Secretary to provide competitive grants to entities with expertise in the conduct of water supply technology research, development, and demonstration projects. The subsection also provides that the grants shall be provided consistent with the technology roadmap and that not more than 25 percent of funds made available for grants shall be provided to National Laboratories and Federal agencies.

Subsection (g) directs the Secretary to establish a third-party review of: the technology roadmap; technology milestones; plans for commercial application developed under the program; and to assess the progress of the program in achieving the technical milestones and plans for commercial application.

Subsection (h) directs the Secretary to submit a report to Congress that describes the activities carried out under this Act three years after the date of enactment of this Act and each year thereafter.

Subsection (i) provides that any activities carried out under this Act shall comply with section 988 of the Energy Policy Act of 2005 (42 U.S.C. 16352) related to cost-sharing.

Section 4 subsection (a) authorizes $5,000,000 to be appropriated for fiscal year 2006 to carry out the roadmap under section

3(e)(2)(C) and authorizes to be appropriated such sums as necessary for each fiscal year thereafter.

Subsection (b) provides that, for amounts appropriated for fiscal year 2007 and each fiscal year thereafter, not more than 25 percent shall be made available to the one or more lead laboratories. The subsection further provides that, if more than one laboratory is designated as a lead laboratory, the amount appropriated to the lead laboratories shall be distributed equally among the lead laboratories for the conduct of activities under the program, including to carry out section 3(a)(2). The subsection further provides that, for amounts appropriated for fiscal year 2007 and each fiscal year thereafter, at least 60 percent shall be made available for program grants under section 3(f), of which, at least 20 percent shall be made available for demonstration projects. The term "demonstration projects" includes: tests of water supply technologies intended to assess performance in the natural variability of real world parameters and outside of well-controlled laboratory conditions which reduce the risk for commercial application; tests designed to identify problems associated with using a water supply technology on a large scale and other problems that may arise in applying a new water supply technology in a field setting; and tests designed to incorporate water supply technology into large-scale production and commercial applications. The subsection further provides that not more than 15 percent shall be used to pay the administrative costs of carrying out the program, including costs to support the advisory panel.

COST AND BUDGETARY CONSIDERATIONS

The following estimate of costs of this measure has been provided by the Congressional Budget Office:

S. 1860—Water Supply Technology Program Act of 2005

Summary: S. 1860 would authorize research and development (R&D) on water supply technologies at the Department of Energy (DOE). The new program would support collaborative research by national laboratories, universities, and water agencies on practical applications of technologies in such areas as desalination, contaminant removal, and water reuse and recycling. The bill would authorize the appropriation of $5 million for the program in 2006 and such sums as may be necessary thereafter. Other provisions would direct the Secretary of Energy to assess technology needs, set research priorities, and coordinate efforts with other agencies and a Water Supply Technology Advisory Panel.

CBO estimates that implementing this bill would cost about $94 million over the 2006–2010 period, assuming appropriation of the necessary amounts. Enacting this bill would have no effect on direct spending or revenues.

S. 1860 contains no intergovernmental or private-sector mandates as defined by the Unfunded Mandates Reform Act (UMRA). The bill would authorize a research and development program that would benefit participating institutions of higher education and water agencies. Any costs incurred by those entities would result from complying with conditions for receiving federal assistance.

Estimated cost to the Federal Government: The estimated budgetary impact of S. 1860 is shown in the following table. The costs of this legislation fall within budget function 270 (energy).

	By fiscal year, in millions of dollars—				
	2006	2007	2008	2009	2010
CHANGES IN SPENDING SUBJECT TO APPROPRIATION					
Estimated Authorization Level	5	15	25	35	45
Estimated Outlays	4	8	17	27	38

Basis of estimate: CBO assumes that the bill will be enacted by the end of calendar year 2005 and that the amounts necessary to implement the R&D program will be appropriated for each year. CBO estimates that implementing this program would require funding levels to increase from the $5 million authorized for 2006 to about $45 million by 2010.

As outlined by the bill, the program would support R&D by multiple parties—at least one national laboratory, one university, and a water supply agency—and focus on the development, demonstration and commercialization of complex technologies. Thus, CBO expects that this water supply program would be similar in scale to DOE's other applied research and development initiatives, which generally spend between $10 million and $80 million a year. Estimated outlays are based on historical trends for such similar R&D programs.

Intergovernmental and private-sector impact: S. 1860 contains no intergovernmental or private-sector mandates as defined by UMRA. The bill would authorize a research and development program that would benefit participating institutions of higher education and water agencies. Any costs incurred by those entities would result from complying with conditions for receiving federal assistance.

Estimate prepared by: Federal Costs: Kathleen Gramp. Impact on State, Local, and Tribal Governments: Lisa Ramirez-Branum. Impact on the Private Sector: Craig Cammarata.

Estimate approved by: Peter H. Fontaine, Deputy Assistant Director for Budget Analysis.

REGULATORY IMPACT EVALUATION

In compliance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee makes the following evaluation of the regulatory impact which would be incurred in carrying out S. 1860. The bill is not a regulatory measure in the sense of imposing Government-established standards or significant responsibilities on private individuals and businesses.

No personal information would be collected in administering the program. Therefore, there would be no impact on personal privacy.

Little, if any, additional paperwork would result from the enactment of S. 1860.

EXECUTIVE COMMUNICATIONS

The testimony provided by the Department of Energy at the full Committee hearing on S. 1860 in the 109th Congress follows:

STATEMENT OF DOUGLAS L. FAULKNER, ACTING ASSISTANT SECRETARY FOR ENERGY EFFICIENCY AND RENEWABLE ENERGY, DEPARTMENT OF ENERGY

Mr. Chairman and Members of the Committee, I appreciate the opportunity to testify today on S. 1016, requiring the Secretary of Energy to make incentive payments to the owners of qualified desalination facilities to partially offset the cost of electrical energy required to operate facilities, and S. 1860, which would amend the Energy Policy Act of 2005 to improve energy production and reduce energy demand through improved use of reclaimed waters and other purposes.

Although supplying and distributing water is largely a local responsibility, we believe there is a Federal role in providing appropriate scientific and technological support for these efforts. S. 1016, however, poses a narrower question: Should the Department of Energy subsidize electricity costs at desalination facilities? We believe the answer is no. While well intended, S. 1016 is not a comprehensive approach to the challenge we face. It would subsidize a narrow group of electricity users engaged in water desalination efforts, and could divert limited Federal funding from efforts to engage in a more comprehensive approach.

It is our view that incentive payments are not the best means to remove the energy cost barriers to desalinating water. Instead, we feel continued targeted Federal support for desalination research and development consistent with the Administration's Research and Development Investment Criteria, as well as our ongoing efforts to reduce energy demand and increase supply through the adoption of comprehensive energy legislation, will have a larger impact in the long-run on reducing desalination costs than will making incentive payments to the owners or operators of individual facilities.

The Department of Energy finds S. 1860 to be well intentioned as it shares our view that we must develop innovative new approaches to dealing with the regional, national, and global challenges related to water availability and quality. However, we have several concerns regarding the specific language of this bill.

First, the bill appears to shift substantial statutory authority from the Secretary to the designated National Labs and places the lead National Labs in inappropriate roles for assessing Federal funding and activities across agencies. We are also concerned that the bill appears to leave out the private sector and its key role in RD&D and commercialization.

The bill places as much as two-thirds of the funding at the lead National Labs, largely outside of any merit-based competitive process and it does so with little flexibility, not recognizing that the allocation of funding will vary with the status of technology RD&D and commercialization, and private sector roles. We believe that the funding levels,

roles and responsibilities for the Labs, Universities, and private sector should be determined by the Secretary in order to meet the national needs identified by the legislation.

We share the view that we must develop innovative new approaches to dealing with the regional, national, and global challenges related to water availability and quality, and this is an issue that is commanding significant attention at the highest levels of the Administration.

For example, in August 2004 the White House Office of Science and Technology Policy (OSTP) and Office of Management and Budget (OMB) identified water as a top Administration research and development priority and called upon the National Science and Technology Council (NSTC) to "develop a coordinated, multi-year plan to improve research to understand the processes that control water availability and quality, and to collect and make available the data needed to ensure an adequate water supply for the Nation's future." The NSTC Committee on Environment and Natural Resources has formed a Subcommittee on Water Availability and Quality (SWAQ) comprised of more than 15 Federal Departments and Agencies who are now in the process of developing a comprehensive research plan. Their first report, "Science and Technology to Support Fresh Water Availability in the United States," was released in November, 2004. Among the points highlighted by this report are the following:

- We do not have an adequate understanding of water availability at national, regional, or local levels.
- Water, once considered a ubiquitous resource, is now scarce in some parts of the country—and not just in the West as one might assume.
- The amounts of water needed to maintain our natural environmental resources are not well known.
- We need to evaluate alternatives to use water more efficiently, including technologies for conservation and supply enhancement such as water reuse and recycling as a way to make more water available.
- We need improved tools to predict the future of our water resources to enable us to better plan for the more efficient operation of our water infrastructure.

The Water Desalination Act of 1996 (Public Law 104–298) gave lead responsibility to the Department of the Interior to conduct, encourage, and assist in the financing of research to develop cost-effective and efficient means for converting saline water into potable water suitable for beneficial uses. We are looking at ways to better coordinate our efforts with those of the Department of the Interior and other agencies through the process underway in the NTSC's Subcommittee on Water Availability and Quality.

At the Department of Energy, we have been in serious discussions with some of our labs on what we call the "energy-water nexus." The relationship between energy and water is not well understood by the public, and it is sur-

prising to many, for instance, that the amount of fresh water withdrawn nationally for electricity production is more than twice as much as the water used for residential, commercial, and industrial purposes, and is comparable to the amount of water used for agricultural irrigation. Meanwhile, pumping, storing, and treating water consumes huge amounts of electricity—an estimated 7 percent of California's electricity consumption is used just to pump water.

We understand that our energy and water supplies are interconnected. In fact, as much energy is used for water and wastewater purposes as for other major industrial sectors of the U.S. economy such as paper and pulp and petroleum refining.

Although the hearing today focuses on producing drinkable water through a technological process, the equally important aspect of the larger issue is finding ways to reduce water consumption and remove some of the demand pressure from regional water supplies. Price and regulatory signals can create market incentives to reduce water use. One area for consideration is the water intensive process of thermoelectric generation from fossil fuels such as coal. For these systems, an average of 25 gallons of water is withdrawn to produce a kilowatt hour (kWh) of electricity of which nearly one-half gallon is consumed by evaporation. Overall, fossil-fuel-fired power plants require withdrawals of more than 97 billion gallons of fresh water each day.

The Department's Office of Fossil Energy is supporting several research projects aimed at reducing the amount of fresh water needed by power plants and to minimize potential impacts of plant operations on water quality. One project at West Virginia University is assessing the feasibility of using underground coal mine water as a source of cooling water for power plants. A North Dakota project is attempting to reduce the water consumption of power plants by recovering a large fraction of the water present in the plant flue gas. A project in New Mexico is exploring whether produced waters, the byproduct of natural gas and oil extraction which often present a disposal issue, can be used to meet up to 25 percent of the cooling water needed at the San Juan Generating Station, as well as investigating an advanced wet-dry hybrid cooling system. In addition, the Department currently has a competitive solicitation on the street seeking additional innovative technologies and concepts for reducing the amount of fresh water needed to operate fossil-based thermoelectric power stations, including advanced cooling and water recovery technologies. The Department is also investigating whether a suite of specially selected, salt-tolerant agricultural crops or other plants can be used to remove sodium and other salts from coalbed methane produced water so that it can be safely discharged or used in agriculture.

One promising new approach to electricity generation, Integrated Gasification Combined Cycle (IGCC) technology

that converts coal and other hydrocarbons into synthetic gas, offers significant environmental and water benefits compared to traditional pulverized coal power plants. Because the steam cycle of IGCC plants typically produces less than 50 percent of the power output, IGCC plants require 30 to 60 percent less water than conventional coal-fired power plants. The Department is supporting research, development, and demonstration on a number of advancements that will significantly drive down the costs of IGCC plants.

The Fossil Energy office is also supporting work at the University of Florida investigating an innovative diffusion-driven desalination process that would allow a power plant that uses saline water for cooling to become a net producer of fresh water. Hot water from the condenser provides the thermal energy to drive the desalination process. Using a diffusion tower, saline water cools and condenses the low pressure steam and fresh water is then stripped from the humidified air exiting the tower. This process is more advantageous than conventional desalination technology in that it may be driven by waste heat with very low thermodynamic availability. In addition, cool air, a by-product of this process, can be used to cool nearby buildings.

The Department's Office of Energy Efficiency and Renewable Energy (EERE) is supporting R&D for innovative wind and solar electricity supply technologies that have attributes that may prove to be very beneficial to the desalination industry.

For example, wind power is now becoming a competitive, clean, bulk electric power supply option in many areas of the Nation, and places no further demand on water supplies for its operation. In addition, excellent offshore wind resources are available near many coastal areas facing water supply challenges. The role that wind could play in powering desalination could take a range of forms, from stand-alone systems exclusively powered by wind, to desalination plants that receive the majority of their energy requirements from wind power delivered via electricity grid systems. In either case, the relative ease and low cost of storing desalinated water, in comparison with storing electricity, will allow operating flexibilities that will facilitate using inherently variable wind power as a primary energy source for desalination.

We are currently funding a concept design study which will set up engineering and economic models to examine viability of wind-powered reverse osmosis systems, looking at applications for coastal seawater, inland brackish water, and water produced during oil or gas recovery. A second project will model solar and wind resources for a desalination unit to determine the effects of variable loads on desalination, and perform pilot-scale testing to determine how renewable energy could reduce desalination costs.

We are also undertaking a mapping project to overlay data such as fresh and brackish water resources, wind resources, water consumption, estimated growth, and elec-

tricity supply. Two maps will be developed, one of the United States, and one for the four-state region of Colorado, Utah, Arizona, and New Mexico, identifying locations that have the best economic and technical potential for using wind to power desalination. Even as we proceed with these activities, we are mindful that the energy intensive technique of reverse osmosis we use for desalination today may not be the membrane technology of tomorrow. But whether that breakthrough comes from a lab working specifically on desalination, or through an area of broader scientific research remains to be seen. The Department's Office of Science, for example, is studying microbes and smart membranes that may ultimately have relevance to desalination in the future.

Having said that, it seems certain that desalination will play an important role in maintaining and expanding our Nation's, and indeed, the world's water supply. Where fresh water aquifers are under pressure in many regions, over-drafted and subject to saltwater intrusion, brackish aquifers can be found throughout the country and the world, a ready source of new water. More than 120 countries are now using desalination technologies to provide potable water, most commonly in the Persian Gulf where energy costs are low. The desalination plants of the future must come in a range of sizes so that they can be installed where demand exists-smaller footprint facilities which can make use of smaller deposits of impaired water, at a price the community can afford. For American companies, the growing need for desalination will open new global markets. Mr. Chairman, this completes my prepared statement, and I am happy to answer any questions the Committee may have.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, the Committee notes that no changes in existing law are made by the bill S. 1860, as ordered reported.

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