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Balanced Approach and Improved R&D Management Needed to Achieve Energy Efficiency Objectives

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Committee on Science, Space,
and Technology
House of Representatives

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Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to appear before you today to discuss the energy conservation and efficiency aspects of the administration's National Energy Strategy (NES), and our recent report on the Department of Energy's (DOE) energy conservation research and development (R&D) programs.

The NES established the administration's long-range blueprint for a more efficient, secure, and environmentally safe energy future for the United States and its allies. The President is legislatively mandated to prepare and submit such a plan to the Congress every 2 years.

In summary, we question whether the NES will succeed in achieving its energy efficiency goals for the following reasons:

-- The current NES is not comprehensive because it does not contain proposals that address the possibility that energy prices may remain relatively low in the future. Relatively low energy prices reduce the urgency for developing and using energy-efficient technologies. Yet, the NES relies to a large extent on the development and adoption of energy efficient technologies to reduce future energy consumption.

-- Current energy prices do not cover all of the costs to society of obtaining and using energy. For example, our heavy use of fossil fuels produces a range of adverse environmental consequences. Higher energy prices that reduce energy consumption would correspondingly reduce environmental pollution.

-- The National Academy of Sciences reported that the NES' energy policy modeling was hampered by difficulties in forecasting technological change and relatively poor data quality on energy demand.[1] These limitations raise questions about the validity of DOE's projections of the effects of implementing the NES.

In addition, we have previously reported that DOE's energy conservation R&D management and planning needed to be strengthened.[2] In this vein, we have recommended actions designed to improve DOE's energy conservation R&D planning and mandate annual independent reviews of DOE's energy efficiency R&D programs. While DOE has made planning changes that are responsive to some of our recommendations, additional planning and management actions will be necessary to fully address our concerns.

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[1]First Advisory Report: Development of the National Energy Modeling System, National Research Council, Washington, D.C. (Jan. 1991). The National Research Council is the principal operating agency of the National Academy of Sciences.

[2]Energy R&D: Conservation Planning and Management Should Be Strengthened (GAO/RCED-90-195, July 30, 1990).

POLICY APPROACHES FOR ENCOURAGING GREATER EFFICIENCY IN ENERGY USE

There are a number of ways that the government can encourage greater efficiency in energy use. For instance, policies that raise energy prices, such as taxes, can reduce the demand for energy while correspondingly increasing the demand for more efficient energy technologies. In addition, government-sponsored R&D can result in more and cheaper energy-efficient technologies being developed. The government could also require energy efficiency by placing mandatory constraints on inefficient energy use and hasten the development and use of energy efficient technologies. Finally, the government could subsidize the production or use of more efficient energy technologies.

Many of the administration's NES proposals are directed at increasing government R&D funding for energy-efficient technologies for the longer term and providing information to households and industry on energy efficient-technologies in the shorter term. For example, the NES proposes increasing industry/government cost-shared R&D on advanced battery technologies for electric vehicles and information dissemination through distribution of the "Gas Mileage Guide." However, the NES places little emphasis on the other approaches discussed earlier.

LOW ENERGY PRICES COULD JEOPARDIZE NES EFFICIENCY GAINS

The success of the NES proposals to improve energy efficiency is directly tied to the price of energy because relatively low energy prices generate less urgency to identify and implement efficient alternatives. In contrast, sustained higher prices would encourage the development and use of more efficient technologies. However, as part of the process of developing the NES, the administration considered and rejected policy measures (such as energy taxes) aimed at raising the price of energy because of their anticipated effects on the economy. In fact, higher energy prices, particularly if not phased in over time, could produce adverse economic consequences unless other offsetting policy actions are taken. In this regard, a recent Data Resources Incorporated (DRI) study[3] found that the adverse economic consequences of higher energy taxes could be offset by reducing other federal taxes. However, current low energy prices do not reflect all of the costs to society of the production and use of most fuels. For example, sustained low gasoline prices may result in decreased demand for relatively fuel-efficient automobiles, increased vehicle miles traveled, and a consequent increase in environmentally damaging emissions. The administration's approach of depending on R&D and the dissemination of information on energy-efficient technologies

[3]Review of the U.S. Economy, DRI/McGraw Hill (Mar. 1991).

may not be as effective as projected if current low oil prices continue.

Others also share this concern. For example, DOE's Oak Ridge National Laboratory reported in a background paper for the NES that, overall, price signals can strongly motivate or discourage energy-related purchases and operations. Further, the laboratory added that one primary barrier to the adoption and use of energy-efficient technologies is distorted fuel prices--prices which are too low because they do not fully reflect the environmental and social costs associated with fuels production, conversion, transportation, and use.

Similarly, the Secretary of Energy's Advisory Board reviewed the NES Interim Report and expressed concern about energy prices. The Board cautioned that if the national energy policy is going to be one of relying on market forces to determine energy choices, options to ensure that all of the costs of energy production and use are reflected in market prices (e.g., through taxes) must also be considered. Finally, the Council of Economic Advisers reported to the President that private market forces are unlikely to give adequate weight to national security and environmental considerations in setting energy prices. In summary, the market prices for energy, particularly fossil fuels, do not fully reflect all the costs of its production and consumption.

We believe that significant inroads against energy inefficiency are more likely to be realized if the price of energy better reflects all of its costs. Simply put, if American households and businesses find it in their financial self-interest to use energy efficiently, they are more likely to do so.

ANALYTICAL BASIS FOR OMITTING PRICE MEASURES AND PROJECTING ENERGY EFFICIENCY GAINS UNCERTAIN

For some time, we have been trying to obtain the administration's supporting analyses behind the NES to determine, among other things, the rationale for omitting policy measures that directly affect the price of energy. Unfortunately, the complete analytical basis for the administration's approach to achieving its energy efficiency goals has not been made available to us. Further, for some of the options that were omitted from the final NES, such as increasing vehicle efficiency standards, DOE has told us that it could be months before it provides the supporting analyses. We previously noted that the release of the detailed analyses of all options considered for inclusion in the NES would provide an important basis for informed congressional and public debate of the merits of the NES.[4]

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[4]Energy Policy: Evolution of DOE's Process for Developing a National Energy Strategy (GAO/RCED-91-76, Feb. 21, 1991).

In refining its models to perform analyses for the NES, DOE necessarily had to make numerous assumptions. For example, DOE found it necessary to make assumptions about what technologies will become available in the future and when the market will adopt them. However, when using models, even relatively small changes in assumptions can produce rather large changes in outcomes. In fact, in commenting on DOE's modeling, the National Academy of Sciences emphasized that DOE's assumptions, including assumptions on future technological choices, may very well drive the results of the models. The academy also noted the relatively poor quality of data on energy demand. For example, the Academy reported that there is little information (at DOE or elsewhere) on the potentials for energy-efficiency improvements in the industrial sector. Further, the Academy stated that "[t]he feasibility of new or alternative energy supply and some end-use technologies appear to rely on estimates made by DOE that are based on limited experience and have a documented history of over-optimism."

Because of the limited information available to us and the questionable reliability of the information used in DOE's models, it is uncertain whether DOE's projections of energy efficiency improvements resulting from the administration's NES proposals will come to pass. At the very least, policy makers should be aware of the great uncertainty associated with such projections.

PLANNING AND MANAGEMENT OF ENERGY EFFICIENCY R&D NEED TO BE IMPROVED

The NES relies to a large extent on R&D to achieve greater energy efficiency. Consequently, it is critical that DOE's energy R&D efforts prepare us for the energy scenarios we may face in the future. The administration's fiscal year 1992 conservation R&D budget request of $274 million for buildings, transportation, industrial, and utility technologies is a 28 percent increase over fiscal year 1991 funding. It should be noted that the fiscal year 1992 request is still below the $296 million[5] this important R&D program received in fiscal year 1980.

The effective use of the limited R&D funding available will depend on strong planning and management--areas in which we found problems that are discussed in our July 1990 report on the energy conservation R&D program. I would like to outline the recommendations we made for DOE to improve the conservation R&D planning and management and comment on the status of DOE's responses.

In our July 1990 report, we concluded that DOE's multi-year conservation R&D plan would be more credible and useful for management purposes if it included information on the individual projects being proposed. We also concluded that the multi-year

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[5]Nominal dollars--not adjusted for inflation.

planning process was not based on a systematic review of the individual projects by top management that would assure federal policy makers that the DOE conservation R&D portfolio reflects current needs and priorities and that outdated and/or weaker projects are terminated expeditiously. We recommended (1) that detailed program and project information be incorporated in the plan and (2) that the planning process include a systematic review of individual projects by DOE's top Office of Conservation management to help ensure that the portfolio reflects current needs. DOE has not implemented our recommendation to include information on the individual projects in the multi-year plan. In response to our recommendation for top-level reviews of individual projects, the Acting Director of the Office of Planning and Assessment in the Office of Conservation and Renewable Energy said that it would not be appropriate for the Assistant Secretary to review all conservation and renewable projects. We have continuing concerns regarding the visibility and review of individual conservation R&D projects--about 475 in 1989. We continue to believe that top management participation in reviewing individual projects and detailed program information is needed.

We also found that officewide priorities based on costs and benefits could not be established because the Conservation program offices used differing methodologies to rank its proposed R&D activities. For example, the quantitative measures used by two of the offices were not compatible--one used a benefits analysis and

the other used a cost/benefit analysis. We recommended that DOE use a uniform methodology so that it could prioritize its projects. The Office of Conservation and Renewable Energy is taking steps to implement this recommendation, but has not yet developed a uniform methodology.

In addition, we reported that activities needed to effectively promote the commercialization of research efforts were performed unevenly in conservation R&D programs. The most common problem we found was that DOE was not sufficiently identifying how the technologies, processes, or information would be used by the public and private sectors. We recommended that the multi-year planning process include technology transfer milestones to encourage a more systematic approach to addressing technology transfer issues. DOE has responded that technology transfer milestones will be listed in annual R&D plans. The Acting Director of the Office of Planning and Assessment in the Office of Conservation and Renewable Energy said that guidance to the R&D managers emphasizes the importance of planning for technology transfer.

We also reported that the conservation R&D planning process was not integrated with DOE's budget process. The plan produced funding estimates at only one level rather than at varying levels as is required in budget formulation and assumed the availability of unlimited funding. We recommended that DOE develop conservation

R&D plans at varying funding levels to provide a link to and support for DOE's budget process. The Office of Conservation's new multi-year plans now under development will be formulated at a number of funding levels.

Finally, we reported that although all key DOE managers cited important benefits from the independent peer review program initiated in 1985, the last such review of a conservation R&D program was conducted in 1988. We concluded that a mandate from top management was necessary to continue this program officewide. We also found that DOE's unstructured, informal responses to the peer review recommendations created uncertainties and misunderstandings among those managing and conducting the research. We concluded that more systematic, documented responses are needed to fully reap the benefits of independent assessments. We recommended that the cognizant deputy assistant secretaries be required to (1) have independent peer reviews conducted annually and (2) examine peer review recommendations as part of the Office's multi-year planning process.

The Acting Director of Conservation and Renewable Energy's Office of Planning and Assessment said he agreed with our findings and that within the next 6 months an evaluation program implementing our recommendation for mandatory independent reviews will be reestablished. He added that the workload associated with the NES process and DOE's new Strategic Planning Initiative,

discussed below, has delayed the development of a new evaluation program. We are concerned with the delay in reestablishing the conservation R&D independent peer review program. We believe that evaluation and planning are equally important as each process should provide important feedback to the other. Therefore, we continue to believe that a conservation R&D evaluation program should be reactivated at the earliest possible time.

On a more comprehensive basis the Secretary of Energy has recognized the need for improvements in the Department's strategic planning process through a new strategic planning initiative. This effort, if properly implemented, should also address some of the problems we identified with DOE's conservation R&D planning.

CONCLUSION

A well-conceived and properly executed NES is important to our economic and environmental well being, and to our national security. The Nation's vision on these issues must necessarily extend well into the 21st Century if we are to be fully prepared for the alternative energy futures we may face. As such, we believe that a NES needs to consider a full range of energy efficiency and conservation policies and options and DOE's R&D efforts must be managed effectively to support the overall energy conservation/efficiency effort.

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This concludes my prepared statement. I would be glad to answer any of questions that you or other members of the Committee may have.