AMERICAN ACADEMY
OF ARTS & SCIENCES

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Department of Energy
Office of the Under Secretary for Science (S4)
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Washington, DC 20585

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To the DOE–QTR Leadership Team:

To ensure the acceptance and adoption of new energy technologies by individuals, communities, and businesses, and to meet the administration's national energy goals, there is a critical need to identify important non-technical barriers and to assess how they might be better understood and managed using insights from the social sciences. Many of these non-technical barriers are not fully addressed by federal energy policies. As a result, the deployment of new energy technologies, including energy efficiency and smart grid technologies, is slowed.

Through its Alternative Energy Future project (http://www.amacad.org/projects/alternativeNEW.aspx), the American Academy of Arts and Sciences is examining the legal, social, and economic barriers to the adoption of new energy technologies. This letter builds on the preliminary findings of the Alternative Energy Future committee, and is submitted in response to the following question from the Quadrennial Technology Review (QTR) framing document: "A number of non-technical barriers – including federal, state, and local regulations, market failures, and non-technical risks – impact the rate of deployment of energy technologies. What, if any, role should the Department have in addressing these barriers?"

The members of the Alternative Energy Future committee have identified several non-technical issues that require new thinking from social scientists in order to maximize the success of innovative new energy technologies. Although some of these issues lie outside the purview of DOE, **we strongly urge that DOE work with other agencies to consider each of these questions as part of the government-wide Quadrennial Energy Review (QER):**

1. **What are the barriers to achieving social consensus on energy policies, and how can these barriers be overcome?** Social consensus is more than understanding new technologies and accepting the need for new policies. Rather, the desire to improve the energy system should become a social norm that not only motivates collective action, but also influences individual, household, and community decision-making.

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2. **How do individuals and communities respond to technological changes in the energy system?** How individuals and communities respond to technological changes in the energy system and to the policies adopted to bring those changes about is crucial to the success of energy policy. Thus, policy-makers must consider how best to facilitate technology adoption. For example, what incentives are likely to be most effective in influencing energy-related decisions? And how can policy-makers anticipate and address resistance to change?

3. **How do federal energy regulations need to change to support new energy technologies?** Changing the energy system will require new regulations as well as alterations to existing policies. For example, implementation of carbon capture and storage technologies will require a regulatory regime that does not yet exist. In addition, a variety of existing tax policies must be modified so as not to discourage investments in alternative energy and energy efficiency technologies.

4. **What governance framework will help sustain energy policies over the long term?** There are two dimensions to this issue. First, all levels of government will need to be engaged in the development and implementation of energy policies; thus, balancing federal, state, and local roles will be critical to the long-term sustainability of these policies. Second, policy-makers must determine how to ensure the durability of federal regulatory structures over several decades, even as these structures adapt to new information about scientific, technological, and policy successes.

5. **How will America's energy choices affect our relationship with other nations?** What issues arise from the establishment of international regulatory structures, and how can we reconcile different cultural values? Issues of economic competition, technological cooperation, and national security may emerge.

6. **What will be the effect of changing the energy system on other physical systems, including ecosystems, land use, and water supply?** What will be the public's response to these changes? Can adverse effects best be mitigated by energy policy, or through changes in management regimes for the affected resource (water policy, for example)?

As America develops cleaner, more secure energy sources, it will be increasingly important to understand how to address non-technical barriers to their adoption. Thus, as recommended in the November 2010 report from the PCAST Energy Technology Innovation System Working Group, **we urge DOE to move rapidly to institute a social science research program on energy issues in collaboration with the National Science Foundation.** Such a program would investigate how social science expertise could be incorporated into all stages of federal energy research, development, demonstration, and deployment to facilitate the adoption of innovative energy technologies. It should stress the importance of interdisciplinary research and the inclusion of experts from a wide range of backgrounds, including behavioral scientists, economists, legal scholars, and business leaders. This initiative could be undertaken before the QTR is completed.

On May 19–20, 2011, the American Academy will hold a workshop in Washington, D.C., that will examine many of the issues listed above. This workshop will identify priority areas for future social science research on energy as well as opportunities for new collaborations between policy-makers, technologists, and social scientists. The workshop report will provide a valuable resource for future studies of the non-technical barriers to new energy technologies, including those undertaken as part of the DOE–QTR and the subsequent government-wide QER.

Sincerely,

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