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S. HRG. 112–188

QUADRENNIAL ENERGY REVIEW ACT

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

TO

RECEIVE TESTIMONY ON THE DEPARTMENT OF ENERGY'S QUADRENNIAL TECHNOLOGY REVIEW (QTR) AND TWO BILLS PENDING BEFORE THE COMMITTEE: S. 1703—QUADRENNIAL ENERGY REVIEW ACT OF 2011, AND S. 1807—ENERGY RESEARCH AND DEVELOPMENT COORDINATION ACT OF 2011

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The referenced hearing held before the Senate Committee on Energy and Natural Resourses was inadvertently printed without the Questions and Answers for Ernest J. Moniz. In which follows:

RESPONSES OF ERNEST J. MONIZ TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. One of the most vigorous debates on energy policy is the extent of the subsidies we should offer, and what areas we should target with those subsidies. To the extent that the government finds funding to allocate to energy, where do you believe we should focus our efforts? Where do you believe we can have the greatest impact—basic research, commercialization, or some combination of those activities?

Answer. The innovation system spans invention (research and discovery, knowledge creation, prototype generation); translation (creation of a commercial product or process); adoption (technology deployment and initial use); and diffusion (increasing adoption and use at scale).

The need for energy technology innovation is considerable for our economy, for our security, and for environmental stewardship, especially for mitigating the risks of climate change. However, energy technology innovation has lagged well behind that seen in other sectors; that is, while the level of activity is at unparalleled levels at the invention and translation stages, the scale-up and widespread deployment of clean energy technologies has been modest. If this adoption and diffusion is to be accelerated, government will need to play a role across the entire innovation chain.

The government role in filling the innovation pipeline through R&D is generally accepted because of the difficulty for individual firms to capture the benefits of early stage research. Because of the particularly strong role of the government at this stage, the highest priority is to continue and indeed expand this government role. The PCAST report offered a benchmark for research, development, demonstration and deployment (RDD&D) funding that would entail an increase of about $10B per year. This could be implemented through direct appropriations (a major challenge given the overall budget constraints) or through a Congressionally-approved small charge on energy production, delivery and/or use. The majority of this funding should be directed to RD&D. Public-private partnerships with strong industry involvement, some with a regional base, should be employed, especially at the demonstration phase.

The Department of Energy has introduced several new approaches to R&D funding: energy frontier research centers, ARPA-E, and energy innovation hubs. These are very promising approaches and DOE energy R&D funding should increasingly be directed towards programs carried out in this manner, whether ARPA-E, Basic Energy Science, or the applied energy programs.

Acceleration of energy technology innovation is more challenging at the adoption and diffusion stages in respect to the government role, since this is taking the government more into the marketplace. The most direct approach for the government is to internalize public policy objectives through economic incentives, for example, a price on carbon dioxide emissions for mitigating climate change risks or on oil consumption for relieving oil dependence. The political barriers to such steps are, by observation, considerable, We are likely to require "second-best" approaches (renewable portfolio and CAFE standards, market share mandates, loan guarantees,.). There are a myriad of such policy instruments and PCAST recommended the QER in large part to sort these out based on strong analysis and substantial input from the Congress and the private sector. The hope is that the QER process can lead to a nonpartisan framework for working across multiple agencies and multiple Congressional committees to stimulate market adoption and diffusion of clean energy technologies. Ideally the process would also led to multi-year Congressional authorizations that would provide increased private sector confidence in the stability of the policy and budgetary framework.

The support for the QER coming from this committee's leadership is both appreciated and important.

Question 2. We regularly hear—often from people at the Department of Energy—that the U.S. is in a "clean energy race" with nations like China and Germany. How can we compare what's happening in those countries, in terms of technology development and industry growth, to find out if we're actually in a "race", let alone winning or losing it? Does the QTR offer a chance for us to set a baseline by which we can compare ourselves to other nations? And how can we go about developing the data to make those comparisons?

Answer. The QTR provides a roadmap for DOE energy technology R&D. As such, it does not explicitly make comparisons with technology development in other countries, nor does it dwell on deployment mechanisms (this is deferred to the QER).

However, the opportunities for capturing the economic competitiveness advantages from the continuing American leadership in research is important and should be one factor in setting the R&D priorities. To do this, a sophisticated understanding of the innovation system and technology status in countries such as China and Germany is needed. As one example, China has jumped to the fore in PV mod-

ule production, offering cost-competitive products internationally and providing tremendous price pressure on firms in the US and elsewhere (including some Chinese PV firms, a number of which are also going out of business). One part of the Chinese success was a focus on all parts of the supply chain, including development of low cost capability for providing production line equipment. Understanding and analysis of such developments has not progressed adequately, and yet could provide useful information for our own government policies and help guide productive investment of US taxpayer dollars in RDD&D. There is currently no mechanism for supporting serious studies of this type at the DOE, a situation that led PCAST to recommend implementation of a social science/economics research program. The program could clarify issues such as consumer needs and preferences, market structures, and the like. An institution analogous to the National Bureau of Economic Research (or possibly even a supplement to it) could provide an interesting model for developing the research base.