Testimony on 'The Future of ARPA-e' to the Subcommittee on Energy, House Committee on Science, Space and Technology

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Chairman Lamb, Ranking Member Weber, members of the committee, I appreciate the opportunity to appear before you today to testify on the Future of ARPA-e. As you know, I was the second Senate-confirmed Director of ARPA-e and served from December of 2014 through January of 2017.

The founding authorization of ARPA-e recognizes the economic, environmental, and energy security importance to the United States of technological innovation in the face of the world's evolving energy systems. As energy systems are changing there is serious international competition in developing and deploying the advanced energy technologies of the modernized systems. I would like the US to remain a leader, and based our capabilities, we should. The United States has been a world leader in basic research for most of the last century. However, our country has been notably less successful in transferring the benefits of its basic research successes into domestic manufacturing and the economic benefits that follow.

ARPA-e was established specifically to support US competitiveness by speeding the translation of promising innovations into domestic advanced energy technologies. Since it started operations in 2009, ARPA-e has demonstrated a transformative research management model in which brilliant innovators are selected on the merit of their proposed work and supported to simultaneously advance the technical performance and commercial potential of their innovations. ARPA-e's model is designed to reduce the technical and financial uncertainty that deter industrial and venture investors.

ARPA-e's success with this model is quantified in part by the metric of private sector follow-on funding for the projects it has supported. As of February of 2018, 134 projects funded by ARPA-e had been able to attract private follow-on funding totalling at least $2.6 billion, significantly exceeding the cumulative support of $1.8 billion dollars provided to ARPA-e's more than 660 projects. The stories of the actual technologies and the teams that make them successful, are even more compelling, but less amenable to quick communication.

The project funding that ARPA-e is now able to provide falls far short of meeting the opportunities that flow from the ingenuity of America's scientists and engineers, and the resulting potential to advance US competitiveness. Many experienced observers, such as the American Energy Innovation Council, have called for a substantial increase in the agency's budget. I agree with

that assessment – as director I led strategic planning for how growth of ARPAE from roughly its present budget to a budget of one billion dollars per year over a period of 5 years could be implemented. In creating strategies for such growth, we recognized that, as successful as ARPA-e is, growth can be structured to yield even greater impact per dollar for the US economy.

The expanded impact can be realized with differential expansion in three areas. First, with an expanded budget ARPA-e should prioritize the problem that, at present, even the most successful ARPA-e projects are still judged to have high risk by potential investors. As a result, they struggle to obtain early investments, or may be undercapitalized. ARPA-E could decrease investment risk with significantly expanded research funding for innovative scaling and advanced manufacturing processes suitable for domestic manufacturing. With a larger base budget, this could be accomplished with funding levels well within ARPA-e's authorization limits on such investment to no more than 50% of the budget. The resulting programs would support the most competitive projects to move from the stage of successful prototypes to pilot scale demonstrations. This expanded effort will increase investment opportunities in the US and prevent prototype technologies from being stranded or frozen out of markets by international competitors who were able to move more quickly.

Second, under an expanded budget ARPA-e should moderately expand its investment in the earliest stage, most innovative, and thus highest risk energy technologies. These represent the pipeline of innovation for the future. ARPA-e's present "OPEN" funding opportunity announcements, which allow proposals in all areas of energy technology, now serve as an important discovery mechanism for new concepts and can readily be expanded. Those "OPEN" projects that prove most successful would then be able to compete for further development funding under the expanded prototypes-to-pilots program category described above.

Finally, ARPA-e should moderately expand its core Focused programs under an expanded budget to include more larger-scale technologies, and to integrate performance demonstrations and prototype-to-pilot funding to optimize hand-off to commercial development. For example, ARPA-e is now testing staged programming that supports a broad portfolio of moderate size projects in stage 1, and a smaller number of the most competitive projects at a higher level in stage 2.

This vision of the Future of ARPA-e is already enabled by the present authorization, and it builds on the successful operational approaches that ARPA-e has demonstrated. An expanded, budget for ARPA-e will enable faster and more effective hand-off of innovative energy technologies to private-sector commercialization in the U.S, boosting US competitiveness and economic growth.