
AEIC Scaling Innovation Case Studies: Lessons for American Energy Innovation Policy

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As Congress considers further investments to help the economy recover from the effects of COVID-19, a focus on clean energy technology is likely as lawmakers seek opportunities to stimulate near-term job creation while also positioning the United States to meet critical long-term challenges such as climate change. In this context, understanding lessons learned from the federal government's past experience with technology policies and programs will be important to ensure that new public investments are well designed and achieve maximum results.

In recent months, the American Energy Innovation Council enlisted experts to review past federal efforts to support energy innovation at scale. The enclosed package of four case studies highlights lessons from this work that are relevant to the larger energy and climate policy debate now unfolding in the context of new stimulus discussions. We are optimistic that these discussions can result in stronger and more effective federal programs for the development and deployment of new technologies given growing bipartisan interest in clean energy and climate change. And while the scope, parameters, and ambition of any emerging national policy agenda for energy and climate remains unclear, technology innovation has been a central element of approaches from across the political spectrum—one that has the support of Republicans and Democrats.

Our case studies focus primarily on federal energy stimulus efforts launched under the American Reinvestment and Recovery Act (ARRA) of 2009. The parallels between the situation in 2009 and the current crisis make this experience especially relevant to today's stimulus policy agenda. In highlighting key lessons from this experience, the challenge of facilitating scale—both in project size and financial commitment—emerges as a consistent and important theme. Demonstrating new technologies at scale is often critical to successful commercialization, but it has historically been one of the most fraught steps in the innovation process.



The AEIC case studies cover four complementary topics:

1. ARRA-funded demonstrations of utility-scale solar energy technology.
2. ARRA-funded demonstrations of large-scale carbon capture and storage (CCS) technology.
3. The process used by the Department of Defense to develop and demonstrate new technology.
4. The rationale for launching a new federally supported institution—a “Clean Energy Deployment Administration”—dedicated to supporting the demonstration and deployment of new energy technologies, and key design features to help ensure that this entity is effective.

Each case study includes an extensive historical review and detailed conclusions, with a focus on specific policy-relevant lessons learned. Each is also unique enough to shed light on different and distinct aspects of the innovation policy challenge.

This introduction draws on the package of work as a whole to offer a set of cross-cutting insights that should inform any new policy initiatives aimed at scaling energy innovation:

1. Innovation does not happen through a set formula, and success requires taking risks.

Promising technologies rarely travel identical paths to market scale. Most require tailored support. The process of innovation inherently requires acceptance of risk, and by extension, acceptance of failure. A portfolio of technologies together with flexible policy tools is the best recipe for developing robust solutions to complex challenges such as climate change.

2. Successful innovation requires patience & support along a technology’s development path.

To bring a new discovery in the lab to market as a commercial product can require coordinated support along many points in the development process. The presence of high costs or early failures is not always indicative of a doomed technology. In some cases, it may instead reflect poor policy design. This insight is illustrated by the experience with utility-scale solar technology, which has been leveraging a strong learning curve to achieve continued price reductions and increased market penetration after overcoming decades of high costs and poor performance. A similar trajectory may apply to CCS, which has faltered in past demonstration programs for reasons that may have more to do with policy shortcomings than with technology limitations. Military technology programs that utilize designed competition and highly curated initial markets to drive new product development offer another proven model.

3. Single policy interventions rarely work alone.

While each intervention is important, single points of policy support, despite their generosity, are rarely sufficient to enable a significant clean energy breakthrough. Direct grants to develop projects are unlikely to create the market that would allow a new technology to establish a foothold. Similarly, stand-alone deployment incentives do not always generate needed early-stage innovations when the path to market is years away or unclear.



4. A portfolio of policies is most effective.

Multiple policies working in concert are most likely to be successful in driving the commercialization of meaningful technology innovations. After decades of basic and applied R&D, solar PV was successfully deployed at utility-scale because a package of federal programs, including loan guarantees and direct cash grants, aligned with emerging state supports to create a large and credit-worthy procurement market through renewable portfolio standards. The result is today's large solar industry, which is now able to compete with conventional technologies.

5. Strong institutions are as important as good policy.

For technologies to make the transition from lab to market, effective policy needs to be implemented by strategic institutions with the right tools and culture. The U.S. military has a proven approach to demonstrating and procuring new technologies. For new energy technologies, the Department of Energy's toolkit may need to be enhanced given the enormous challenges of moving to a low-carbon economy. Several improvements have been proposed, including the creation of a new institution like CEDA.

We hope these case studies and cross-cutting policy insights together help advance the goal of improving American performance in energy innovation. Later this year, the AEIC will be releasing specific policy recommendations informed by these case studies and broader policy insights. The scale-up and demonstration of clean energy technologies is a critical gap in our energy innovation ecosystem that must be addressed, and therefore will be the major focus of AEIC during the remainder of 2020.

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