



## Insight

# To Get Most out of Publicly Funded Research, Evaluate Technology Transfer Programs

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## Summary

- The United States spends over \$12 billion per year to support the Department of Energy's (DOE) national security and energy research efforts, and has programs intended to allow the resulting inventions to be commercialized and offer economic value.
- The DOE has neglected evaluating these commercialization programs recently: The Trump Administration has not issued a new strategy for these commercialization efforts, and has implemented new pilot programs without reporting on the results of old ones.
- Now that the DOE offices overseeing technology transitions are staffed, it should devote more attention to these research-commercialization programs by issuing statutorily required reports evaluating them and developing a strategy to maximize the value of federal spending.

## Introduction

This year, [Congress appropriated](#) \$12.9 billion in funding for energy programs and another \$6.3 billion for science research, 13 percent more than the previous year and 38 percent above the Department of Energy's (DOE) request. The government funds research, in either publicly funded [National Labs](#) or in partnership with universities or private companies, on a variety of subjects, and some of this research has implications for the private sector. [Previous research](#) from AAF has shown the economic value of research from the National Labs.

Getting the most economic benefit out of research funding requires a pathway for new government-supported technology to be commercialized. These efforts have had a number of notable success, including commercialized nuclear power, metal alloys as a substitute for lead in soldering, and laser pulses to strengthen commercial aircraft wings. [Some examples](#) of currently funded research projects with possible private-sector implications include safety software for advanced nuclear reactors, energy storage via compressed air in porous rock, wireless charging for autonomous vehicles, and more energy-efficient building materials to replace concrete.

The government has many programs to facilitate this commercialization, and even an entire office in the DOE dedicated to it, yet these mechanisms can be improved, as the DOE has [noted in the past](#). The Obama Administration initiated a number of changes, including pilot programs, to improve this commercialization process, but the Trump Administration has not assessed whether these changes have been a success, perhaps because it has staffed the DOE slowly. Certain key posts within the DOE have been filled recently though,

providing an opportunity for the department to return some focus to improving the commercialization process.

## **The History of Technology Transfer Policies**

The DOE has supported the commercialization of its research from the department's beginning. In 1977, Congress established the DOE amid several oil crises. The U.S. economy, because of how much energy it imported, was vulnerable to market manipulation by energy-exporting states, and Congress created a new department to strengthen the country against this strategic vulnerability. The DOE would support domestic energy research and development (R&D), including by aiding commercialization of this research, and it has pursued that goal vigorously for 40 years.

Since 1986, the federal government's primary tool for transferring technology from government research to the private sector (a process called technology transfers or technology transitions, or simply T2) has been the "Cooperative Research and Development Agreement" (CRADA), which was born from the Federal Technology Transfer Act of 1986. CRADAs allow private companies to partner with government researchers to cooperatively conduct R&D. Typically, the DOE has around 700 CRADAs active per year. These CRADAs have operated alongside around 2,000 "strategic partnership projects," (SPPs) another kind of agreement with publicly funded labs that traces its origin to 1954.

In the mid-2000s, the government renewed its focus on bolstering domestic energy production. Fear that oil imports were helping to fund terrorism returned governmental priorities to domestic energy production. Simultaneously, growing environmental concerns were creating a political impetus for government support of cleaner energy sources. The Energy Policy Act of 2005 created the Technology Commercialization Fund (TCF) to facilitate the expansion of T2s further.

The Obama Administration's Department of Energy implemented policies to improve the T2 process. These policies' objective was to move away from the restrictive nature of CRADAs and SPPs, which made it difficult to partner the National Labs with multiple businesses for single development agreements and can restrict the negotiation of patent privileges. Toward this end, the Obama Administration began several T2 pilot initiatives. These include the "Agreements for Commercializing Technology" (ACT), which was a pilot program for cooperative R&D partnerships intended to create a more flexible alternative to CRADAs, and the Small Business Vouchers Pilot, which expands the number of potential private sector T2 partners.

## **Trump Administration Transition Troubles**

Since the beginning of the Trump Administration, however, there has been little reporting on the status of these pilot programs. The ACT pilot, for example, was concluded in 2017 by Secretary Perry, and expanded writ large while also creating a second pilot program for federally funded ACTs—but there were concerns that the program could distract from federal missions, and OTT has not evaluated the program or issued any new reports that could explain its successes or failures

DOE, like other executive agencies, has struggled to fulfill its duties under slow staffing by the new

administration. DOE lacked an Undersecretary for Science until November 2017 and did not have a Director for the Office of Technology Transitions (OTT) until January 2018. In the meantime, the prevailing doctrine for T2 policy has been the 2016 Technology Transfer Execution Plan (TTEP), which still alludes to President Obama's preference for supporting energy research to satisfy the now-defunct "Climate Action Plan."

Simply, the United States is spending a lot of money on energy research each year, and to maximize the benefit of that funding, it must have pathways for the private sector to adopt this publicly supported innovation. Now that Secretary of Energy Rick Perry has the relevant leadership positions of DOE staffed, he should prioritize strengthening the T2 process. He has expressed an interest in [improving federal innovation policies](#) (through competitive programs and prize offerings, for example), but he should also evaluate the existing pilots and develop a more comprehensive strategy, articulated in a TTEP, to frame future efforts.

## OTT Tasks for Improving U.S. T2 Policies

The Office of Technology Transitions oversees the commercialization of publicly supported technology development via existing T2 initiatives and improving the commercialization process. It has not provided an update on this mission since its last annual report to Congress [on the status of T2s](#) from the National Labs (i.e. number of cooperative R&D agreements, active licenses, revenues, etc.) back in June 2016.

Generally, OTT should provide status updates on the commercialization efforts and its own recommendations for improving the process. Below are several specific reforms and near-term actions OTT could implement:

- *Update the Technology Transfer Execution Plan:* The existing TTEP aligns with the priorities of the previous administration, not the current one. OTT needs to provide private-sector partners clarity, though an updated plan, on what the current administration's DOE is seeking to achieve with its T2 efforts. An updated TTEP would also give Congress clarity on DOE's funding needs.
- *Evaluate the Successes of the ACT Pilot:* The "Agreements for Commercializing Technology" (ACT) pilot began in 2012 to ease restrictions on cooperative development between commercial businesses and National Labs. Outside of this pilot program, National Labs mostly partner with only a single company per agreement, and the company is responsible for all costs incurred in the research. Further, current rules limit the shape of patent licensing agreements. ACT, by contrast, allows multiple companies to participate in a single development effort, allows the National Labs to cover laboratory usage costs, and creates flexibility in negotiating patent rights. Only a handful of National Labs participated in this program, which expired in October of 2017. In November, Secretary Perry authorized all National Labs to engage in ACTs and created a new pilot program for federally funded ACTs called "FedACT." Some have questioned, however, whether ACT would unfairly subsidize partners and distract from federal missions. ACTs will be important to expanding T2s, but currently the public lacks insight on if their design can be improved.
- *Evaluate if the Funding Ratios of the Technology Commercialization Fund are Appropriate:* The TCF, under the Energy Policy Act of 2005, receives for commercialization efforts 0.9 percent of all funding for applied research. The TCF spends approximately \$20-25 million per year on commercialization (a total that is then matched by the private sector), but this might not be enough: The 2016 TTEP noted that many government-supported inventions lacked funding to create prototypes—often a critical step in commercialization.

- *Evaluate the Small Business Vouchers Pilot:* In January 2016, the DOE’s Office of Energy Efficiency and Renewable Energy (EERE) began a pilot program that gave small businesses access to National Labs facilities. OTT should assess the effectiveness of this program, its potential to be expanded to other energy research and development efforts, and whether it distracts from federal policy efforts.
- *Determine if the Lab-Corps Pilot Program Should be Extended or Expanded:* The Lab-Corps pilot program teaches DOE-funded researchers how to make their technology more appealing for commercialization. Lab-Corps represents a fairly low-risk and low-cost effort, but it is not yet known how much of a difference it has made.
- *Seek Lessons from ARPA-E’s T2M Requirements:* As part of its innovation efforts, the DOE funds non-DOE research through a mechanism called “Advanced Research Projects Agency – Energy” (ARPA-E) which is modeled after similar efforts from the Department of Defense. ARPA-E requires that participants have a plan to get their technology to market (T2M), and the outcomes of T2M efforts may provide insight for commercializing other early-stage inventions.

## Conclusion

The Trump Administration, through the DOE’s OTT, has several policy levers it can pull to improve the effectiveness of the funds Congress dedicates to energy research. Now that key positions in the DOE have been filled, OTT should evaluate the government’s T2 efforts expeditiously, and develop a comprehensive strategy for improving existing T2 programs and creating new one