Energy research is alive and well, notwithstanding Trump's antipathy to research in general and climate/energy research in particular. We mostly associate energy research with the Department of Energy, its network of national labs, and its ARPA-E program. I've written previously about those programs and the importance of energy innovation. But it turns out that a lot of energy research takes place elsewhere in the federal government.

The Defense Department is a big player in this space. DoD is the largest single consumer of energy in the world and has long had an interest in new energy technologies. From the Pentagon's point of view, renewable energy lessens the dependence of bases vulnerable supply lines for fuels, microgrids could make electricity supply to bases more reliable, lighter batteries will help troops and reduce the weight of vehicles, and energy efficiency cuts expenses. There's a nice survey of the military programs here.

As the NRDC explains, one key advantage of Pentagon involvement is that funding doesn't cut off after the initial research phase. "DoD is the largest participant in a federal program providing seed funding for early-stage innovations that are too high risk for the private sector and has offices overseeing the transition of appropriate military technology to public use." On the research side, DoD has major collaborations with the National Renewable Energy Law. And according to an MIT/Hoover website, "Defense-wide spending in 2012 on energy research, development, testing, and demonstration alone was $1 billion—though even this was but 1 percent of its total innovation budget."

Congress, even with today's GOP majorities, seems completely onboard with this. For instance, the House Report on last year's military appropriations bill encouraged work on energy research said:

> The Committee supports continued research in power generation and energy storage and notes that the development and deployment of lithium ion batteries are critical to current and future missions. However, the Committee understands that safety concerns have often hindered the operational use of lithium ion batteries. The Committee believes that the development and qualification of materials technologies, such as non-flammable electrolytes, aimed at improving lithium ion battery safety and performance should be a research priority. (p. 246)

It may be less surprising that the National Science Foundation is also involved in energy research. According to NSF:

> The goal of the Energy for Sustainability program is to support fundamental engineering research that will enable innovative processes for the sustainable production of electricity and fuels, and for energy storage. Processes for sustainable energy production must be environmentally benign, reduce greenhouse gas production, and utilize renewable resources. Research projects that stress molecular level understanding of phenomena that directly impacts key barriers to improved system level performance (e.g. energy efficiency, product yield, process intensification) are encouraged.

The 2018 spending bill strengthened the federal government's role in energy research. According to the American Association for the Advancement of Science (AAAS), "solar technology (including photovoltaics R&D), manufacturing programs, and vehicle technology (including battery tech, electricification, and advanced engines). Each of these programs received at least a $31 million plus-up over FY 2017." Congress also rejected the Administration's effort to slash ARPA-E and other energy research programs.

Energy research is crucial to bring down the cost of carbon-free energy, electrify transportation, and ensure that the grid can handle the long-term elimination of fossil fuels. Current technology has advanced well beyond what was expected just a few years ago, but it won't get us to our 2050 goals. It's good to see that, despite the political turbulence, the federal government still stands firmly behind this important effort.