

## Why GAO Did This Study

Federal interest in batteries and other energy storage technologies has increased in recent years to help address energy, defense, and space exploration challenges. The federal government has devoted substantial resources to support such technologies for the electric grid, electric vehicles, warfighting, and other uses.

GAO was asked to (1) identify the scope and key characteristics of federal battery and energy storage initiatives; (2) determine the extent to which there is potential fragmentation, overlap, or duplication, if any, among these initiatives; and (3) determine the extent to which agencies coordinate these initiatives. GAO focused on fiscal years 2009 through 2012 because DOE made large investments in these technologies during these years. GAO surveyed initiatives identified in six agencies: DOE, DOD, NASA, NSF, EPA, and NIST. GAO included questions about the following key characteristics: funding obligations, technologies, uses, technology advancement activities, goals, eligible funding recipients, and funding mechanisms. GAO analyzed survey responses and interviewed agency officials to gather more information. GAO examined external coordination for all agencies and internal coordination in DOE and DOD because they had the largest obligations of the agencies GAO reviewed.

This report contains no recommendations. In response to the draft report, DOE, DOD, NASA, and NSF provided technical comments, which GAO incorporated as appropriate. The other agencies had no comments.

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# BATTERIES AND ENERGY STORAGE

## Federal Initiatives Supported Similar Technologies and Goals but Had Key Differences

### What GAO Found

GAO identified 39 battery and energy storage initiatives with a variety of key characteristics that were implemented across six agencies: the Departments of Energy (DOE) and Defense (DOD), the National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF), the Environmental Protection Agency (EPA), and the National Institute of Standards and Technology (NIST). These initiatives obligated over \$1.3 billion from fiscal years 2009 through 2012. Initiatives supported a variety of technologies, uses, advancement activities, and goals. Several types of recipients were eligible for funding, such as private industry, universities, and federal labs, through contracts, grants, and other mechanisms.

GAO found that initiatives were fragmented and had overlapping characteristics but did not find clear evidence of duplication. Initiatives were fragmented because they were involved in the same broad area of national need: to advance batteries and other energy storage technologies. Thirty initiatives had overlapping characteristics in that they supported similar technologies, uses, advancement activities, and goals. These initiatives also had similar types of eligible funding recipients. Although fragmented and overlapping initiatives create the risk of potential unnecessary duplication, initiatives supported agency-specific missions and strategic priorities that differentiated their efforts. In addition, agency officials involved with the initiatives reported differences in the technologies needed for specific uses, specific goals, and the types of recipients eligible for assistance.

Agencies reported several activities to coordinate with each other on their battery and energy storage initiatives, including initiatives that were overlapping. Activities were consistent with practices that GAO has previously reported can help enhance coordination such as agreeing on roles and responsibilities. In addition, DOE has taken steps to internally coordinate its battery and energy storage initiatives through activities that, among other things, defined common technology goals. DOD has also taken actions to improve its coordination of battery and energy storage initiatives based on a recommendation in a prior GAO report.

**Agency Battery and Energy Storage Initiatives and Funding Obligations, Fiscal Years 2009 through 2012**

Agency	Number of initiatives	Funding obligations <sup>a</sup>
DOE	11	\$851,994,808 <sup>b</sup>
DOD	14	430,274,229 <sup>c</sup>
NASA	8	20,811,374 <sup>c</sup>
NSF	4	8,582,868
EPA	1	3,258,029
NIST	1	1,375,000 <sup>c</sup>
<b>Total</b>	<b>39</b>	<b>\$1,316,296,308</b>

Source: GAO analysis of survey responses.

<sup>a</sup>All funding obligations for fiscal year 2012 are estimated.

<sup>b</sup>In addition to these obligations, DOE supported about \$596 million in direct loans.

<sup>c</sup>Includes estimates for some obligations for fiscal years 2009 through 2011.