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SENATE

{ REPORT
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ARPA-E REAUTHORIZATION ACT OF 2019

JANUARY 7, 2020.—Ordered to be printed

Ms. MURKOWSKI, from the Committee on Energy and Natural Resources, submitted the following

R E P O R T

[To accompany S. 2714]

[Including cost estimate of the Congressional Budget Office]

The Committee on Energy and Natural Resources, to which was referred the bill (S. 2714) to amend the America COMPETES Act to reauthorize the ARPA-E program, and for other purposes, having considered the same, reports favorably thereon with amendments and recommends that the bill, as amended, do pass.

AMENDMENTS

The amendments are as follows:

On page 2, between lines 18 and 19, insert the following:

(c) AWARDS.—Section 5012(f) of the America COMPETES Act (42 U.S.C. 16538(f)) is amended—

(1) by striking “In carrying” and inserting the following:

“(1) IN GENERAL.—In carrying”; and

(2) by adding at the end the following:

“(2) CONSIDERATION OF PRIOR GRANTS.—In awarding a grant under paragraph (1), the Director shall take into account the success or failure of any project carried out by the entity applying for the grant using any prior grant funds awarded to that entity by the Director.”.

On page 2, line 19, strike “(c)” and insert “(d)”.

On page 3, line 19, strike “(d)” and insert “(e)”.

On page 4, line 14, strike “(e)” and insert “(f)”.

On page 5, line 4, strike “(f)” and insert “(g)”.

On page 5, line 18, strike “(g)” and insert “(h)”.

PURPOSE

The purpose of S. 2714 is to amend the America COMPETES Act (COMPETES Act, Public Law 110–69) to reauthorize the Advanced Research Projects Agency—Energy (ARPA–E) program.

BACKGROUND AND NEED

ARPA–E is an agency within the Department of Energy (DOE) that is modeled after the Defense Advanced Research Projects Agency. ARPA–E was first authorized in the America COMPETES Act of 2007 (Public Law 110–69), although it was not funded until 2009 as part of the American Recovery and Reinvestment Act (Public Law 111–5). Significant modifications to the programmatic structure were also made in the America COMPETES Reauthorization Act of 2010 (Public Law 110–358).

ARPA–E funds high-risk, high-reward early stage research and development (R&D) in energy technologies. It has unique hiring and other transactional-related authorities to allow the agency to move quickly, hire skilled employees, halt funding for projects that are not meeting milestones, and limit long-term staff employment.

Over the last decade ARPA–E has provided \$2 billion in R&D funding to over 800 projects in various energy-related fields. To date, those projects have attracted \$2.9 billion in private-sector follow-on investment; led to the formation of 76 spin-off companies; and resulted in the issuance of 346 patents. In 2017, the National Academies of Science conducted a comprehensive assessment of ARPA–E and found that the agency focused its efforts on the most transformative technology opportunities and avoided duplicating research being conducted by other DOE offices.

While ARPA–E’s \$312 million funding authorization expired in fiscal year (FY) 2013, current funding for FY 2020 is estimated at \$428 million. S. 2714, the ARPA–E Reauthorization Act, updates the appropriations authorization to reach \$750 million in FY 2024, and makes several structural amendments to the agency’s organizing statute.

LEGISLATIVE HISTORY

S. 2714 was introduced on October 28, 2019, by Senators Van Hollen and Alexander. The Energy Subcommittee held a hearing on S. 2714 on November 6, 2019. Senators Gardner and Heinrich were later added as cosponsors.

Representative Bernice Johnson introduced similar legislation, H.R. 4091, in the House of Representatives on July 30, 2019, which was referred to the Committee on Space, Science, and Technology. The House Space, Science, and Technology Committee favorably reported H.R. 4091 on October 17, 2019.

In the 115th Congress, Representative Bernice Johnson introduced similar legislation, H.R. 3681, in the House of Representatives on September 6, 2017, which was referred to the Committee on Space, Science, and Technology.

The Senate Committee on Energy and Natural Resources met in open business session on November 19, 2019, and ordered S. 2714 favorably reported, as amended.

COMMITTEE RECOMMENDATION

The Senate Committee on Energy and Natural Resources, in open business session on November 19, 2019, by a majority voice vote of a quorum present, recommends that the Senate pass S. 2714, if amended as described herein. Senator Lee asked to be recorded as voting no.

COMMITTEE AMENDMENTS

During its consideration of S. 2714, the Committee adopted an amendment to insert a new subsection (c) in section 2 of the bill, to require the ARPA-E Director to take into account the prior success or failure of ARPA-E projects carried out by an entity currently seeking project funding from the agency. The Committee also adopted conforming amendments to redesignate subsections (c) through (g) of the bill as subsection (d) through (h).

SECTION-BY-SECTION ANALYSIS

Section 1. Short title

Section 1 sets forth the short title of the bill.

Section 2. ARPA-E amendments

Section 2(a) amends section 5012(c) of the COMPETES Act relating to the goals of ARPA-E to add energy technologies that improve the resilience, reliability, and security of infrastructure to produce, deliver and store energy. It replaces the word “energy” with “advanced” in subsection (c)(2) of the COMPETES Act such that ARPA-E shall achieve its goals through “advanced technology projects” rather than “energy technology projects.”

Subsection (b) strikes the word “energy” from section 5012 (e)(3)(A) of the COMPETES Act.

Subsection (c) amends section 5102(f) of the COMPETES Act to require the Director to take into account the prior success or failure of ARPA-E projects carried out by an entity currently seeking funding for a project.

Subsection (d) expands ARPA-E’s annual reporting requirement in section 5012(h) of the COMPETES Act to include an identification of (1) projects that examine topics and technologies closely relating to other activities funded by the Department, and (2) current, proposed, and planned projects. This subsection also requires an update to the strategic vision roadmap by October 1, 2021, and every four years thereafter.

Subsection (e) amends section 5012(i) of the COMPETES Act regarding coordination and duplication. It adds a requirement that an award may not be provided for a project unless the prospective award recipient demonstrates that they have made a sufficient attempt to secure private financing or that the project is not independently commercially viable.

Subsection (f) amends section 5012(l) of the COMPETES Act regarding a third party evaluation of ARPA-E to direct the Secretary of Energy to commission an updated evaluation three years after enactment.

Subsection (g) amends section 5012(o)(2) of the COMPETES Act to authorize funding for ARPA-E from FY 2020 through 2024, rising from \$428 million in FY 2020 to \$750 million in FY 2024.

Subsection (h) makes technical changes to section 5012 of the COMPETES Act.

COST AND BUDGETARY CONSIDERATIONS

The following estimate of the costs of this measure has been provided by the Congressional Budget Office:

S. 2714, ARPA-E Reauthorization Act of 2019			
As ordered reported by the Senate Committee on Energy and Natural Resources on November 19, 2019			
By Fiscal Year, Millions of Dollars	2020	2020-2024	2020-2029
Direct Spending (Outlays)	0	0	0
Revenues	0	0	0
Increase in the Deficit	0	0	0
Spending Subject to Appropriation (Outlays)	2	690	2,510
Statutory pay-as-you-go procedures apply?	No	Mandate Effects	
Increases on-budget deficits in any of the four consecutive 10-year periods beginning in 2030?	No	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

S. 2714 would reauthorize activities of the Advanced Research Projects Agency-Energy (ARPA-E), an agency tasked with researching and developing transformative energy technologies, through fiscal year 2024. The bill also would amend ARPA-E's requirements for submitting annual reports and strategic vision roadmaps to the Congress.

S. 2714 would authorize appropriations totaling \$2.9 billion over the 2020–2024 period. In 2019, the Congress appropriated \$366 million for ARPA-E. Because CBO scores continuing resolutions on an annualized basis, in 2020 CBO assumes that the same amount of funds will be available under the current continuing resolution (Public Law 116–69). As a result, CBO estimates that S. 2714 would authorize an increase in spending subject to appropriation in 2020 of \$62 million, the difference between the authorized amount and the annualized amount under the continuing resolution. Based on historical spending patterns, and assuming appropriation of the authorized and necessary amounts, CBO estimates that implementing S. 2714 would cost \$690 million over the 2020–2024 period and \$1.8 billion after 2024.

The costs of the legislation (detailed in Table 1) would fall within budget function 270 (energy).

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER S. 2714

	By fiscal year, millions of dollars—												
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2020–2024	2020–2029	
Estimated Authorization ^a	62	497	567	651	750	0	0	0	0	0	2,527	2,527	

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER S. 2714—
Continued

	By fiscal year, millions of dollars—												
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2020– 2024	2020– 2029	
Estimated Outlays	2	21	79	197	391	536	550	463	230	41	690	2,510	

^aS. 2714 would authorize the appropriation of \$428 million in 2020 for ARPA-E activities. However, CBO estimates that \$366 million has been allocated on an annualized basis from funds made available under the current continuing resolution (Public Law 116-69), which provided appropriations through December 20, 2019. Thus, the estimated authorization for 2020 (\$62 million) is equal to the specified amount (\$428 million) minus the annualized amount from the continuing resolution (\$366 million).

On November 5, 2019, CBO transmitted a cost estimate for H.R. 4091, the ARPA-E Reauthorization Act of 2019, as ordered reported by the House Committee on Science, Space, and Technology on October 17, 2019. S. 2714 is similar to H.R. 4091, and CBO's estimates of the budgetary effects of those bills are the same.

The CBO staff contact for this estimate is Aaron Krupkin. The estimate was reviewed by H. Samuel Papenfuss, Deputy Assistant Director for Budget Analysis.

REGULATORY IMPACT EVALUATION

In compliance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee makes the following evaluation of the regulatory impact which would be incurred in carrying out S. 2714. The bill is not a regulatory measure in the sense of imposing Government-established standards or significant economic responsibilities on private individuals and businesses.

No personal information would be collected in administering the program. Therefore, there would be no impact on personal privacy.

Little, if any, additional paperwork would result from the enactment of S. 2714, as ordered reported.

CONGRESSIONALLY DIRECTED SPENDING

S. 2714, as ordered reported, does not contain any congressionally directed spending items, limited tax benefits, or limited tariff benefits as defined in rule XLIV of the Standing Rules of the Senate.

EXECUTIVE COMMUNICATIONS

The testimony provided by the Department of Energy at the November 6, 2019, hearing on S. 2417 follows:

TESTIMONY OF ASSISTANT SECRETARY DANIEL SIMMONS,
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE EN-
ERGY, U.S. DEPARTMENT OF ENERGY

INTRODUCTION

Chairman Cassidy, Ranking Member Heinrich, and Members of the Energy Subcommittee of the Committee on Energy and Natural Resources, thank you for the opportunity to testify today on legislation pertinent to the Department of Energy now pending in the Senate. My name is Daniel Simmons, and I am the Assistant Secretary for

the Office of Energy Efficiency and Renewable Energy (EERE).

As the Assistant Secretary, I am responsible for overseeing a broad portfolio of energy efficiency and renewable energy programs. The technologies in my portfolio advance America's economic growth and energy security while enhancing the reliability and resilience of the U.S. energy system. The Department of Energy supports improving the energy efficiency and reducing energy costs, while at the same time ensuring important performance standards are met or exceeded. For instance, we want to ensure schools and other buildings are sufficiently bright to ensure safety, and that water flow from faucets is strong enough to clean dirty hands. Today, I would like to share what relevant work my office has done and is doing in the areas that these bills address.

I have been asked to testify on eleven (11) bills today, addressing a range of important energy issues. The Administration continues to review all of these bills. I appreciate the ongoing bipartisan efforts to address our Nation's energy challenges and I look forward to working with the Committee.

BILLS

S. 2714—ARPA-E Reauthorization Act of 2019

S. 2714, the ARPA E Reauthorization Act of 2019, would authorize a significant increase in the Department of Energy's Advanced Research Project Agency-Energy's funding, from \$428 million in Fiscal Year 2020 to \$750 million in Fiscal Year 2024. The bill also adds an annual reporting requirement for ARPA-E's scale-up and demonstration activities and would broaden the authorized scope of ARPA-E to support not only projects that improve the resilience, reliability, and security of America's energy infrastructure but also those that improve the management, clean-up, and disposal of radioactive waste and spent nuclear fuel.

The Department will continue to review the legislation and looks forward to working with Congress as the legislative process moves forward.

CONCLUSION

Thank you again for the opportunity to testify before the Subcommittee today. The Department appreciates the ongoing bipartisan efforts to address our Nation's energy challenges, and looks forward to working with the Committee on the legislation on today's agenda and any future legislation. I would be happy to answer your questions.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, the changes in existing law made by S. 2714, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

AMERICA COMPETES ACT

Public Law 110–69, as Amended

* * * * *

TITLE V—DEPARTMENT OF ENERGY

* * * * *

SEC. 5012. ADVANCED RESEARCH PROJECTS AGENCY—ENERGY.

* * * * *

(c) GOALS.—

(1) IN GENERAL.—The goals of ARPA–E shall be—

[(A) to enhance the economic and energy security of the United States through the development of energy technologies that result in—

- (i) reductions of imports of energy from foreign sources;
- (ii) reductions of energy-related emissions, including greenhouse gases; and
- (iii) improvement in the energy efficiency of all economic sectors; and

(A) to enhance the economic and energy security of the United States through the development of energy technologies that—

- (i) reduce imports of energy from foreign sources;
- (ii) reduce energy-related emissions, including greenhouse gases;
- (iii) improve the energy efficiency of all economic sectors; and
- (iv) improve the resilience, reliability, and security of infrastructure to produce, deliver, and store energy;

(B) to ensure that the United States maintains a technological lead in developing and deploying advanced energy technologies.

(2) MEANS.—ARPA–E shall achieve the goals established under paragraph (1) through **[energy]** *advanced* technology projects by—

- (A) identifying and promoting revolutionary advances in fundamental and applied sciences;
- (B) translating scientific discoveries and cutting-edge inventions into technological innovations; and
- (C) accelerating transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty.

* * * * *

(e) RESPONSIBILITIES.—The responsibilities of the Director shall include—

- (1) approving all new programs within ARPA–E;
- (2) developing funding criteria and assessing the success of programs through the establishment of technical milestones;
- (3) administering the Fund through awards to institutions of higher education, companies, research foundations, trade and industry research collaborations, or consortia of such entities,

which may include federally-funded research and development centers, to achieve the goals described in subsection (c) through targeted acceleration of—

(A) novel early-stage **[energy]** research with possible technology applications;

* * * * *

(f) AWARDS.—

[In carrying] (1) *IN GENERAL.*—In carrying out this section, the Director may provide awards in the form of grants, contracts, cooperative agreements, cash prizes, and other transactions.

(2) *CONSIDERATION OF PRIOR GRANTS.*—*In awarding a grant under paragraph (1), the Director shall take into account the success or failure of any project carried out by the entity applying for the grant using any prior grant funds awarded to that entity by the Director.*

* * * * *

(g) PERSONNEL.—

* * * * *

(3) HIRING AND MANAGEMENT.—

(A) *IN GENERAL.*—The Director shall have the authority to—

(i) make appointments of scientific, engineering, and professional personnel without regard to the civil service laws;

(ii) fix the basic pay of such personnel at a rate to be determined by the Director at rates not in excess of Level II of the Executive Schedule (EX-II) without regard to the civil service laws; and

(iii) pay any employee appointed under this **[subpart]** *subparagraph* payments in addition to basic pay, except that the total amount of additional payments paid to an employee under this subpart for any 12-month period shall not exceed the least of the following amounts:

(I) \$25,000.

(II) The amount equal to 25 percent of the annual rate of basic pay of the employee.

(III) The amount of the limitation that is applicable for a calendar year under section 5307(a)(1) of title 5, United States Code.

* * * * *

(h) REPORTS AND ROADMAPS.—

(1) *ANNUAL REPORT.*—As part of the annual budget request submitted for each fiscal year, the Director shall provide to the relevant authorizing and appropriations committees of Congress a report **[describing projects]** *describing*—

(A) *projects* supported by ARPA-E during the previous fiscal year~~], including projects that examine topics and technologies closely relating to other activities funded by the Department;~~

(B) *an analysis of whether the Director is in compliance with subsection (i)(1)(A) in supporting projects that exam-*

ine the topics and technologies described in subparagraph (A); and

(C) current, proposed, and planned projects to be carried out pursuant to subsection (e)(3)(D).

(2) STRATEGIC VISION ROADMAP.—Not later than [October 1, 2010, and October 1, 2013] *October 1, 2021, and every 4 years thereafter*, the Director shall provide to the relevant authorizing and appropriations committees of Congress a roadmap describing the strategic vision that ARPA-E will use to guide the choices of ARPA-E for future technology investments over the following [3] 4 fiscal years.

(i) COORDINATION AND NONDUPLICATION.—

(1) IN GENERAL.—To the maximum extent practicable, the Director shall ensure [that the activities] *that—*

(A) the activities of ARPA-E are coordinated with, and do not duplicate the efforts of, programs and laboratories within the Department and other relevant research agencies[.]; and;

(B) an award is not provided for a project unless the prospective award recipient demonstrates that—

(i) the prospective award recipient has made a sufficient attempt to secure private financing, as determined by the Director; or

(ii) the project is not independently commercially viable.

(2) TECHNOLOGY TRANSFER COORDINATOR.—To the extent appropriate, the Director may coordinate technology transfer efforts with the Technology Transfer Coordinator appointed under section 1001 of the Energy Policy Act of 2005 (42 U.S.C. 16391).

* * * * *

(l) ARPA-E EVALUATION.—

(1) IN GENERAL.—[After ARPA-E has been in operation for 6 years] *Not later than 3 years after the date of enactment of the ARPA-E Reauthorization Act of 2019*, the Secretary shall offer to enter into a contract with the National Academy of Sciences under which the National Academy shall conduct an evaluation of how well ARPA-E is achieving the goals and mission of ARPA-E.

(2) INCLUSIONS.—The evaluation [shall] *may include—*

(A) [the recommendation of the National Academy of Sciences] a recommendation on whether ARPA-E should be continued or terminated; and

(B) a description of lessons learned from operation of ARPA-E, and the manner in which those lessons may apply to the operation of other programs of the Department.

(3) AVAILABILITY.—On completion of the evaluation, the evaluation shall be made available to Congress and the public.

* * * * *

(m) FUNDING.—

(1) FUND.—There is established in the Treasury of the United States a fund, to be known as the “Energy Trans-

formation Acceleration Fund”, which shall be administered by the Director for the purposes of carrying out this section.

(2) AUTHORIZATION OF APPROPRIATIONS.—Subject to ~~paragraphs (4) and (5)~~ *paragraph (4)*, there are authorized to be appropriated to the Director for deposit in the Fund, without fiscal year limitation—

~~[(A) \$300,000,000 for fiscal year 2008;~~

~~[(B) such sums as are necessary for each of fiscal years 2009 and 2010;~~

~~[(C) \$300,000,000 for fiscal year 2011;~~

~~[(D) \$306,000,000 for fiscal year 2012; and~~

~~[(E) \$312,000,000 for fiscal year 2013.]~~

(A) \$428,000,000 for fiscal year 2020;

(B) \$497,000,000 for fiscal year 2021;

(C) \$567,000,000 for fiscal year 2022;

(D) \$651,000,000 for fiscal year 2023; and

(E) \$750,000,000 for fiscal year 2024.

(3) SEPARATE BUDGET AND APPROPRIATION.—

(A) BUDGET REQUEST.—The budget request for ARPA–E shall be separate from the rest of the budget of the Department.

(B) APPROPRIATIONS.—Appropriations to the Fund shall be separate and distinct from the rest of the budget for the Department.

(4) ALLOCATION.—Of the amounts appropriated for a fiscal year under paragraph (2)—

(A) not more than 50 percent of the amount shall be used to carry out subsection (e)(3)(D);

(B) at least 5 percent of the amount shall be used for technology transfer and outreach activities, consistent with the goal described in subsection ~~[(c)(2)(D)]~~ *(c)(2)(C)* and within the responsibilities of program directors described in subsection (g)(2)(B)(vii); and

(C) no funds may be used for construction of new buildings or facilities during the 5-year period beginning on the date of enactment of this Act.

* * * * *