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MANAGEMENT AND SPENDING CHALLENGES WITHIN THE DEPARTMENT OF ENERGY'S OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
SUBCOMMITTEE ON ENERGY

OF THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTEENTH CONGRESS

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MANAGEMENT AND SPENDING CHALLENGES WITHIN THE DEPARTMENT OF ENERGY'S OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

WEDNESDAY, FEBRUARY 5, 2020

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT,
SUBCOMMITTEE ON ENERGY,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Subcommittees met, pursuant to notice, at 10:01 a.m., in room 2318 of the Rayburn House Office Building, Hon. Bill Foster [Chairman of the Subcommittee on Investigations and Oversight] presiding.

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

HEARING CHARTER

Management and Spending Challenges within the Department of Energy's Office of Energy Efficiency and Renewable Energy

February 5, 2020
10:00 a.m.
2318 Rayburn House Office Building

PURPOSE

The purpose of the hearing is to assess the Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE) use of taxpayer funds to advance clean energy research and development. The Committee will discuss EERE's ability to spend its grant funding in a responsible and timely manner and maintain adequate staffing levels to oversee its broad portfolio of work, given recent management and spending challenges within the office.

WITNESSES

Panel 1

- **Mr. Daniel Simmons**, Assistant Secretary, Department of Energy's Office of Energy Efficiency and Renewable Energy

Panel 2

- **Dr. Charles Gay**, Member, Sandia National Laboratories Energy and Homeland Security External Advisory Board; former Director of the Solar Energy Technologies Office, Department of Energy's Office of Energy Efficiency and Renewable Energy

- **Mr. Anthony M. Reardon**, National President, National Treasury Employees Union

- **Mr. Arjun Krishnaswami**, Policy Analyst, Climate & Clean Energy Program, Natural Resources Defense Council

KEY QUESTIONS

- What are general principles for spending and staffing that will allow EERE to be as productive and efficient as possible?
- Does EERE have adequate staff to administer its growing budget authority?
- Why was Topic 1 of the FY2018 SETO FOA cancelled after completion of DOE's merit review and selection process for applications, and what can be learned from this incident?

- How is EERE working to ensure annual appropriations are obligated and disbursed in a timely manner?

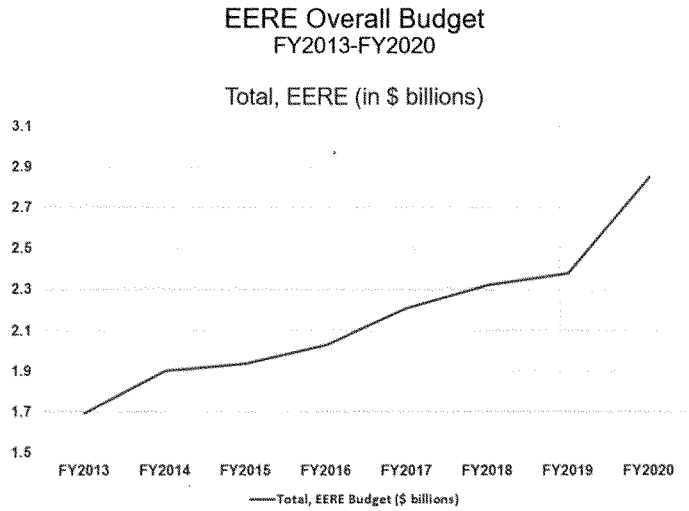
BACKGROUND

EERE serves as the leading Federal office for research & development (R&D) to advance energy efficiency and renewable energy technologies. EERE invests in innovative research projects through Funding Opportunity Announcements (FOA) that award grants to universities, national labs, and companies through a rigorous merit review process. DOE categorizes EERE funding into four main areas: sustainable transportation, energy efficiency, renewable energy, and corporate support (e.g., program administration). Through its investments in clean energy innovation programs, EERE has been instrumental in accelerating deployment of technologies to help the United States address the climate crisis while continuing to meet our nation's energy needs.[1]

Managing Grant Funding in a Responsible and Timely Manner

Since taking office, President Trump has proposed large cuts to energy R&D programs, including a proposal in the Fiscal Year (FY) 2020 request to reduce EERE's budget by more than 80%.[2] Despite this, EERE received $2.8 billion in FY20 funding, an increase of $411 million above the FY19 level and $2.5 billion above the request.[3] EERE's overall budget has increased by nearly 70% since FY13:

[1] Danielson, David. Testimony for hearing entitled "Department of Energy Oversight: Office of Energy Efficiency and Renewable Energy." Mar 24, 2015. Accessed at https://science.house.gov/imo/media/doc/Danielson%20HSST%20Testimony%20FINAL%203-20.pdf.
[2] Congressional Research Service. "Energy and Water Development: FY2020 Appropriations." Nov 25, 2019, accessed here: https://www.crs.gov/Reports/R45708#_Toc25599014.
[3] Funding for EERE is provided in the annual Energy and Water Development Appropriations bill, FY20. Accessed here: https://appropriations.house.gov/sites/democrats.appropriations.house.gov/files/BILLS-116HR1865SA-RCP116-44%20%281%29.PDF.



While it is typical for DOE program offices to carry forward some prior year funds to use for the same purpose in a future year, the amount of funds EERE has carried over from previous years has been on an upward trend, as summarized by the Congressional Research Service (CRS)[4,5]:

FY2012 - FY2020 Start of Year Unobligated Balance for EERE

(in millions of current dollars)

Year	Unobligated Balance brought forward October 1
FY2012	118.9
FY2013	328.7
FY2014	107.8
FY2015	386.1
FY2016	641.0
FY2017	764.6
FY2018	565.5
FY2019	656.4
FY2020	823.8

Source: OMB, *SF 133 Report on Budget Execution and Budgetary Resources* for DOE for FY2012-FY2020.

Notes: Unobligated balances reported in table pertain to funds that do not have a fiscal year expiration date.

[4] Congressional Research Service. Memo to House Science, Space and Technology Committee Staff. Jan 21, 2020.

[5] Notably, in its FY20 budget request, DOE proposed applying $353 million of prior-year unobligated funds to cover over half of its proposed FY20 EERE budget instead of spending those funds as directed by Congress.

EERE shared documentation with Committee Staff on December 13, 2019 that showed a carryover balance for the beginning of FY20 of $810 million, slightly lower than the value identified by CRS. EERE estimated that of that figure, $572 million is carryover in FY19 funds, $112 million is from FY18, and $126 million is from FY17 & prior Appropriations.

Not all factors affecting the size and source of carryover balances are within an agency's control. Regardless, the Government Accountability Office reported that reviewing such balances and asking key questions about them can help provide insights into why a balance exists, what size balance is appropriate, and what opportunities (if any) for savings exist.[6] Effectively managing these funds can also help EERE better estimate future needs and respond to unexpected events, like disruptions in funding.[7]

Abrupt Cancellation of a Multi-Million Dollar Funding Opportunity

EERE itself is divided into several program offices, including the Solar Energy Technologies Office (SETO), which aims to make solar energy resources in the United States more affordable, accessible, and reliable for Americans. In FY20, SETO accounts for $280 million of EERE's $2.8 billion budget. Starting in 2018, SETO has issued a single office wide FOA each year, which integrates the funding opportunities of its sub-programs into one document.

In April 2018, former Secretary of Energy Rick Perry announced[8] that SETO's FY18 FOA would fund about 70 awards for a total investment of $105.5 million.[9] Awards were to be separated into four distinct topic areas, including Topic 1 which focused on Advanced Solar Systems Integrations Technologies (ASSIST). EERE estimated $46 million would be awarded under Topic 1 across approximately 14 projects.

Originally, award finalists were to be announced on September 3, 2018. However, on August 31, despite already having completed a rigorous merit review and selection process for applications to this FOA, EERE cancelled Topic 1 at the direction of the Acting Assistant Secretary for EERE at the time, Ms. Cathy Tripodi. EERE sent applicants a notice saying the office planned to revise and reissue Topic 1 as a separate FOA and that they needed to submit a new proposal to compete

[6] Government Accountability Office. "Budget Issues: Key Questions to Consider when Evaluating Balances in Federal Accounts." Sep 30, 2013. Accessed here: https://www.gao.gov/assets/660/658340.pdf.
[7] Government Accountability Office. "2013 Sequestration and Shutdown: Selected Agencies Generally Managed Unobligated Balances in Reviewed Accounts, but Balances Exceeded Target Levels in Two Accounts." Oct 30, 2015. Accessed here: https://www.gao.gov/products/GAO-16-26.
[8] U.S. DOE. "U.S. Secretary of Energy Rick Perry Announces $105 Million in New Funding to Advance Solar Technologies." Apr 17, 2018. Accessed here: https://www.energy.gov/articles/us-secretary-energy-rick-perry-announces-105-million-new-funding-advance-solar-technologies.
[9] U.S. DOE. "Funding Opportunity Announcement: FY2018 Solar Energy Technologies Office." Accessed here: https://www.energy.gov/eere/solar/funding-opportunity-announcement-fy-2018-solar-energy-technologies-office.

for funding. EERE officially announced its revised ASSIST FOA on October 15, 2018 and selected 10 award finalists on March 25, 2019 to receive a total of $36 million.[10][11]

EERE told Committee Staff that the original ASSIST FOA was cancelled because it lacked adequate focus on grid resilience and cybersecurity.[12] However, agency documentation obtained under the Freedom of Information Act suggests that Ms. Tripodi initiated a rewrite because she did not understand the FOA language.[13] Documentation further shows that Ms. Tripodi kept EERE career staff out of the cancellation, rewrite, and reissuance process.

According a career official in SETO, the entire cancellation and reissuance process cost approximately $1 million.[14] Yet even with the added references to grid resilience and cybersecurity, experts in solar energy technology development have informed Committee Staff that the final ASSIST FOA is substantially similar to the original Topic 1.

If potential grantees do not think that EERE is a reliable partner or doubt that the competitive process is fair, they are less likely to engage with DOE in the future. It is vital that DOE's innovation mission remain independent of political motivation and respectful of the time and money that prospective grantees invest in working with EERE.

Maintaining Adequate Staffing Levels to Manage a Growing Portfolio

EERE must be adequately staffed to administer and oversee its research portfolio and grantees. The Office of Management and Budget and the Government Accountability Office contend that agencies should take steps to assess and, as appropriate, restructure, retrain, and resize full-time equivalent (FTE) levels to achieve their missions as effectively and efficiently as possible.[15] It is critical that EERE's workforce can adequately and successfully support R&D to develop energy efficiency and renewable energy technologies.

As outlined above, annual budgets for EERE overall have increased substantially over the past decade. The EERE Program Direction (PD) budget is the funding line that provides for employee

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[10] U.S. DOE. "Funding Opportunity Announcement: Advanced Systems Integration for Solar Technologies (ASSIST)." Accessed here: https://www.energy.gov/eere/solar/funding-opportunity-announcement-advanced-systems-integration-solar-technologies-assist and here: https://eere-exchange.energy.gov/FileContent.aspx?FileID=e4a2ddcf-36c2-45cb-989e-9067e1a91c8b.

[11] U.S. DOE Solar Energy Technologies Office. "Advanced Systems Integration for Solar Technologies (ASSIST): Situational Awareness and Resilient Solutions for Critical Infrastructure." Accessed here: https://www.energy.gov/eere/solar/advanced-systems-integration-solar-technologies-assist-situational-awareness-and.

[12] EERE Briefing to House Science, Space and Technology Committee Staff on Dec 13, 2019.

[13] E&E News. "Solar grant costs 10 times more than agency claimed – emails." Aug 8, 2019. Accessed here: https://www.eenews.net/stories/1060881569.

[14] Id.

[15] U.S. Office of Management and Budget. Preparation, Submission, and Execution of the Budget, OMB Circular No. A-11. July 2016. See also U.S. Government Accountability Office. "Grants Management: EPA Partially Follows Leading Practices of Strategic Workforce Planning and Could Take Additional Steps." Jan 9, 2017. Accessed here: https://www.gao.gov/products/GAO-17-144.

salaries, travel, and other support services. PD budgets reached a high-water mark of $165 million in FY20.[16] However, EERE staff levels have fallen about 20% in the last three years.

EERE Appropriations & Staffing Levels (dollars in millions)								
	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020
Total, Program Direction	160.5	162.0	160.0	155.0	153.5	162.5	162.5	165.0
--Salaries and Benefits	104.9	102.8	105.7	105.7	104.4	103.7	103.7	-
Total Staff (FTE)	732[17]	707	697	645	680	605	553	-

Given the upward trend in overall EERE funding, the average budget authority per EERE FTE has increased substantially from $3.25 million per employee in FY17 to $5.15 million per employee in FY20.

Committee Staff requested information from the Department on declining staff levels in May 2019. EERE provided a formal report on July 18, 2019 showing that EERE had 554 total staff.[18] EERE has pointed to steps it is taking steps to increase the staff count, including working to post new job announcements on USAJobs.com, participating in a career fair in July 2019, taking advantage of the Office of Personnel Management's new direct hiring authority for Science, Technology, Engineering and Mathematics positions[19], and finalizing selections and offers for vacant positions. However, EERE provided updated data to Committee Staff on December 13, 2019, which showed that staffing levels had not increased.[20]

EERE On-Board Count by Office		
	As of Jul 18, 2019	As of Sep 30, 2019
EERE Sector		
Energy Efficiency	129	133
Renewable Power	61	64
Transportation	74	78

[16] Program Direction is one category within EERE's Corporate Support budget. "Program Direction" includes "Salaries and Benefits," "Travel," "Support Services," and "Other Related Expenses." The funding levels for these subcategories are provided by DOE in subsequent fiscal year annual budget requests; therefore, the FY20 Salaries and Benefits estimate would be in the FY21 budget request, which is not yet available.

[17] Higher FTE count in 2013 may be attributed in part to funding made available by the American Reinvestment and Recovery Act.

[18] FTEs are determined as an annual calculation of total hours worked in a single year. On Board Count (OBC) is the total number of people on board as a snapshot in time. EERE's OBC as of July 18, 2019 was 554.

[19] https://chcoc.gov/content/announcing-government-wide-direct-hire-appointing-authorities

[20] EERE's OBC at the end of fiscal year FY19 was 553. Since its OBC was higher earlier in the year, EERE told Committee Staff that the projected FTE calculation for EERE was 558.

Operations and Front Office[21]	254	244
EERE Total	518	519
NETL Reimbursable FTEs[22]	36	34
Grand Total	554	553

In its FY20 budget request, DOE sought to reduce EERE FTEs a further 25% from planned FY19 levels."[23] The House and Senate Appropriations Committees have expressed bipartisan concerns over EERE's low staffing levels. The final Report Language for the FY20 Omnibus funding agreement signed into law on December 20, 2019 included a direction to EERE[24]:

> *Staffing.*— The Department is directed to report to the Committees on Appropriations of both Houses of Congress not later than 30 days after enactment of this Act with a plan for reaching a staffing level of 675 to 700 full-time equivalents by the end of fiscal year 2020. Furthermore, not more than 50 percent of Working Capital Fund costs shall be paid out of the Program Direction account.[25]

[21] According to EERE, Operations and Front Office staff include EERE Management, Golden Field Office, HQ Operations (Budget, IT, Workforce Management) and Strategic Programs.
[22] EERE funds the National Energy Technology Laboratory (NETL) through a reimbursable agreement to provide financial assistance program management and administration services for a few EERE offices.
[23] U.S. DOE. FY2020 Congressional Budget Request, Budget in Brief, Mar 2019, accessed here: https://www.energy.gov/sites/prod/files/2019/03/f60/doe-fy2020-budget-in-brief_0.pdf.
[24] U.S. DOE. Fiscal Year 2020 Budget Request. Accessed here: https://appropriations.house.gov/sites/democrats.appropriations.house.gov/files/HR%201865%20-%20Division%20C%20-%20EW%20SOM%20FY20.pdf
[25] Senate Committee on Appropriations, Energy and Water Development Appropriations Bill 2020 Report, Sep 12, 2019, accessed here: https://www.congress.gov/116/crpt/srpt102/CRPT-116srpt102.pdf.

Chairman FOSTER. The hearing will now come to order.

And without objection, the Chair is authorized to declare a recess at any time.

Well, good morning, and welcome to this joint hearing of the Investigations and Oversight and Energy Subcommittees. I'm pleased to be wielding the gavel for the first time as the Chair of the I&O Subcommittee and to share leadership of this panel with Ranking Member Norman of South Carolina.

We're here to discuss the Department of Energy's Office of Energy Efficiency and Renewable Energy, EERE, and its efforts to advance clean energy technologies and energy efficiency programs.

As a scientist who spent over 24 years working at one of America's great national laboratories, I know firsthand how vital federally funded research is to scientific breakthroughs. EERE's investments in clean energy are an excellent example. The office has supported many of America's best innovators and businesses in their efforts to research, develop, and demonstrate cutting-edge technologies in sustainable transportation, renewable power, and energy efficiency. It is one of the Federal Government's most powerful tools for addressing climate change and for generating economic opportunities.

You know, for those of you who know, I've spent a lot of my time in Congress as a Co-Chair of the National Labs Caucus and dragging Members of Congress to the 17 DOE (Department of Energy) national labs because it's important that they understand, and they do when they see the wonderful research that's done there. But when things don't go as Congress expects them to, I think that's one of the times that we have to just, you know, put aside our disappointment and try to correct course. And that's what a big part of the charge of this Committee is.

You know, unfortunately, you know, we have a budget process that involves negotiations with the Administration, but ultimately, Congress gets to decide. The proposals from the Administration, in the case of EERE, have cut their R&D (research and development) funding in the past years by more than 80 percent, so we've had a policy disagreement there. But when Congress passes a budget, we expect that budget to be followed. And when we see that it's not and where—and there are things that will be presented by the subsequent witnesses where there may not have been very high-quality, good-faith effort to implement that budget, then there are questions that we must be asking.

You know, I'm really proud that the budget thing has been resolved in prior years and this year in favor of research actually. The—we have had in Congress bipartisan appropriations agreement that provides robust and historically large funding for EERE. And this is a great win for the environment and the future of the U.S. economy.

But yet in recent years it really seems as though EERE has not spent the money that Congress directed to it, and it's been slow to release grant funding. For example, EERE carried over $823 million dollars this fiscal year, which is an increase over previous years. This represents more than 1/3 of the budget that EERE was allocated for last year. We want to make sure that EERE manages

its R&D investments in an efficient manner and in keeping with congressional intent.

Furthermore, it has been brought to this Committee's attention that EERE canceled a $46 million grant days before award finalists were be—were to be announced. Ninety-two applicants, who had submitted proposals to compete for this funding, which was intended to spur innovation in solar energies technologies, ended up going away emptyhanded and confused. It seems as though this decision was made at a political level at EERE, and it seems to have been fairly arbitrary and not based—you know, not based on a thoughtful discussion internally of the issues.

Now, my Committee staff spoke with several researchers that applied to this grant and said they were confused and disempowered by EERE's decision to cancel the funding opportunity so late in the process. And my staff have prepared a report on this issue, which I would now like to enter the staff report into the record. Without objection, so ordered.

Chairman FOSTER. If potential grantees do not think EERE is a reliable partner or doubt that the application process is fair, they are much less likely to engage with DOE in the future, and that would be a loss to the United States. I'm concerned about the chilling effect this could have on scientific research, as well as the potential harm to the United States' position as a global leader in a clean energy future. And given its increased funding, it's vital that EERE manage the R&D spending in as responsible and timely a manner as possible so that we can solve the most important problems of this generation and the next. Obviously, EERE must be adequately staffed so it can manage, administer, and monitor these millions of research dollars. And here again, we perceive a problem. The EERE staff level have dropped since 2017 despite Congress providing more money for salaries and benefits. The Appropriations Committees have expressed concern over EERE's low staffing levels and directed DOE to provide a plan for significantly staffing up by the end of this fiscal year. I understand that they have yet to receive their briefing from EERE on this matter and look forward to seeing that report myself.

Let me be clear that this hearing is not about taking shots at people. I have tremendous respect particularly for the career staff who've—you know, many of them have spent a good hunk of their careers making sure that we have a strong clean energy future for this country. But we're trying to think, you know, how to make sure that such a great Federal research program can really achieve its potential.

This Committee is dedicated to the stewardship of scientific research and the Federal workforce that carries it out. EERE has helped deliver a competitive innovation edge to the United States that requires steady vigilance to maintain. To maintain this commendable legacy of success, it's vital that DOE's innovation mission remain independent of political interference and respectful of the time that stakeholders and personnel invest in their work with the agency.

Assistant Secretary Simmons, I'm glad that you've been able to join us today for this discussion of important issues. I understand, you know, how difficult it can be to find a time that works for both

the Committee and DOE's schedule, and so I am—well, I won't go there. It would have been nicer to have an earlier understanding on when we could have an actual official speak on behalf of EERE here. Happy that you've finally arrived.

And we also have a distinguished second panel in the hearing today. And I thank all the witnesses for being here and their willingness to share their expertise and perspectives. Thank you.

[The prepared statement of Chairman Foster follows:]

Good morning and welcome to this joint hearing of the Investigations & Oversight and Energy Subcommittees. I'm pleased to wield the gavel for the first time as the Chair of Investigations & Oversight and to share leadership of this panel with Ranking Member Norman of South Carolina. We are here today to discuss the Department of Energy's Office of Energy Efficiency and Renewable Energy-EERE-and its efforts to advance clean energy technologies and energy efficiency programs.

As a scientist who spent 24 years working at one of America's great national laboratories, I know firsthand how vital federally funded research is to scientific breakthroughs. EERE's investments in clean energy are an excellent example. This office has supported many of America's best innovators and businesses in their efforts to develop cutting-edge energy technologies. It is one of the federal government's most powerful tools for addressing climate change and for generating economic opportunities.

Unfortunately, the budget proposed by the Trump Administration this past year sought to reduce EERE's R&D funding by more than 80%. I'm proud to say that the bipartisan appropriations agreement signed into law in December provided robust funding for EERE in spite of that. Yet, in recent years, it seems that EERE has been slow to spend. EERE carried over $823 million dollars into this fiscal year. This represents more than a third of the budget EERE was allocated for last year. We want to make sure EERE manages its R&D investments in an efficient manner and in keeping with Congressional intent.

Further, it has been brought to this Committee's attention that EERE canceled a $46 million grant days before award finalists were to be announced. Ninety-two applicants submitted proposals to compete for this funding, which was intended to spur innovation in solar energy technologies. However, it seems political officials at EERE arbitrarily decided to cancel, rewrite, and reissue the grant, circumventing career staff with decades of experience, at significant cost to the taxpayer.

My Committee staff spoke with several researchers that applied to this grant who said they felt confused and disempowered by EERE's decision to cancel the funding opportunity so late in the process. My staff have prepared a report on this issue; I would now like to enter this staff report into the record.If potential grantees do not think EERE is a reliable partner, they are less likely to engage with DOE in the future. I am concerned about the effect this could have on the United States' position as a global leader in clean energy. Of course, EERE must also be adequately staffed so that it can administer its research dollars. EERE staff levels have severely dropped since 2017, despite Congress providing more money for salaries and benefits. The Appropriations Committees have directed DOE to provide a plan for significantly staffing up by the end of this fiscal year. I understand they have yet to receive their briefing from EERE on this matter.

Let me be clear that this hearing is not about taking shots at people. We're here to think about how to make sure a great federal research program can achieve its potential. This Committee is dedicated to the stewardship of scientific research and the federal workforce that carries it out. EERE has helped deliver a competitive innovation edge to the United States. To maintain this legacy of success, it is vital that EERE remain independent of political interference and respectful of the time that stakeholders and personnel invest in their work with the agency.

Assistant Secretary Simmons, I'm glad that you can join us today. I understand how difficult it can be to find a time that works for all our schedules. That is why Committee staff reached out four weeks ago to ask DOE to provide a witness for today's hearing. I look forward to a productive discussion today, as well as a healthy working relationship in the future.We also have a distinguished second panel for the hearing today. I thank the witnesses for being here.

Chairman FOSTER. And I will now recognize Ranking Member for the Subcommittee on Investigation and Oversight, Mr. Norman, for an opening statement.

Mr. NORMAN. Thank you, Dr. Foster and Chairwoman Fletcher, for convening this hearing, and thank you to the Assistant Secretary Daniel Simmons for your testimony and participation this morning.

We're here today to discuss the Department of Energy's Efficiency and Renewable Energy, EERE. We will examine management and spending challenges at EERE, assess the actions it has taken to address and resolve these challenges, and explore its clean energy research, development, demonstration, and commercialization activities.

EERE's mission is to support the United States leadership in the global clean energy economy through a wide variety of research and development initiatives. As such, EERE plays a significant role in opening the door for the widespread use of renewable energy technologies.

Having received $2.85 billion in fiscal year 2020, EERE is the Department's largest applied energy research and development office. Its current spending levels are more than $200 million higher than the total amount of R&D funding for all of DOE's other applied offices combined.

As Ranking Member of the Investigations and Oversight Subcommittee, I recognize the important role of congressional oversight and support this Committee's efforts to shine a light on instances of waste, fraud, and abuse in Federal departments and agencies. Given its historically high funding levels, oversight of EERE spending is certainly warranted. Unfortunately, it seems that the focus of today's oversight hearing is misguided.

We'll hear claims today about EERE not spending their carryover balances, inadequate staffing levels, and a funding opportunity announcement that was canceled. Yet each of these issues can be addressed in a single sentence.

Traditionally, EERE has carried over 25 to 35 percent of total available funding to the next fiscal year, and with their increased budgets, they have continued this trend in each of fiscal years 2016 through 2019. Simple math shows that funding is dispensed at the same rate as a percentage of the total budget. In other words, it's business as usual at EERE.

For staffing, and in accordance with the fiscal year 2020 appropriations package, EERE does owe us a plan to reach the 675 to 700 full-time staff by the end of the fiscal year, but that won't occur until October. Maybe a hearing then would be more appropriate?

And finally, the assertation that a funding opportunity was influenced by political appointees, the Department has every right to revisit, review, and revise FOAs (funding opportunity announcements), and grantees fully understand this when submitting applications. Folks, we do this in our everyday businesses and our family budgets.

Yes, it is unfortunate that financial resources were used to revise this announcement and that applications had to be modified, but I would rather our Federal dollars be spent on a comprehensive, effective funding opportunity than one that fails to align with the Department's mission. In other words, concerns of timeliness must yield to responsible spending.

Additionally, more applications were received for the revised FOA than the original. This fact cuts against the argument that DOE's actions somehow deterred applicants from reapplying for funding. With millions of dollars on the line, these applications clearly recognize the value of patience and perseverance.

I appreciate Assistant Secretary Simmons for altering his schedule and, from what I understand, missing an important event with the Department. To fully utilize your valuable time, I would encourage my colleagues to broaden their focus to the many successes EERE has achieved in the first year in office.

As the Co-Chair of the Solar Caucus, I fully believe in the benefits that renewable energy solutions can have on consumers, businesses, and the environment. However, it's important to stress that the Federal Government should shift away from funding late-stage development for which there already exists a viable market and instead focus on opportunities to fund early stage research and development initiatives.

When the EERE was first established in 1981, renewables like solar and wind were neither technologically nor financially viable energy alternatives. Today, more than 250,000 Americans work in the $17 billion solar industry. It is abundantly clear that consumer demand is already driving increased development of solar technologies. I want to help such technologies grow, but I am not prepared to pay them an allowance once they have reached maturity.

Ideally, a government program should be designed to address a concrete issue, tackle it head on, and work itself out of existence. However, as Ronald Reagan famously said, "The closest thing to immortality is a government program once established." Yet to the dismay of some Members on this Committee, this Administration has previously asked for reductions to EERE applied research funding. For my part, I applaud the Administration's decision to look and take a dynamic look at where funding is most needed and will yield the highest return.

Rather than subsidize established and successful technologies, we should be pursuing breakthrough discoveries in areas like materials, which can fundamentally improve the performance of solar energy technologies. We can prioritize investments so that our research has broad applications in the energy sector and helps responsibly grow the American economy. I would like to thank the DOE for understanding that role and for being there this morning to defend it.

Before I close, I want to take this opportunity to welcome Chairman Foster to the Investigations and Oversight Committee. It's a pleasure to have you on board, Dr. Foster. I look forward to working with you during the remainder of this Congress.

And I again want to thank the witnesses for being here today, and I look forward to your testimony.

Let me say I'm a real estate developer. There's nobody that has more interest in this, in growing this economy in clean businesses than the real estate industry. That's why I'm very, very interested in this topic.

I yield back the balance of my time.

[The prepared statement of Mr. Norman follows:]

Thank you, Chairman Foster and Chairwoman Fletcher, for convening this hearing, and thank you to Assistant Secretary Daniel Simmons for your testimony this morning.

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Before I close, I want to take this opportunity to welcome Chairman Foster to the Investigations and Oversight Subcommittee. It's a pleasure to have you on board, Dr. Foster. I look forward to working with you during the remainder of this Congress.

I again want to thank the witnesses for being here today. I look forward to your testimony.

I yield back the balance of my time.

Chairman FOSTER. Well, thank you. We are honored here to have the full Committee Chairwoman Ms. Johnson with us here today, and the Chair will now recognize the Chairwoman for an opening statement.

Chairwoman JOHNSON. Thank you very much, Mr. Chairman, for holding this joint hearing on oversight to the Department of Energy's Office of Energy Efficiency and Renewable Energy, also known as EERE.

EERE leads the Department's efforts in developing and delivering affordable energy efficiency and renewable energy solutions, aiming to help transform the world's energy system and respond to the global challenges of climate change.

According to EERE, its investments of $12 billion in taxpayers' money toward clean energy research and development has yielded an estimated net economic benefit to the United States of more than $230 billion, with an overall annual return on investment of more than 20 percent. I'm pleased to hear this, given that this Committee has jurisdiction over the Department's vitally important science and energy R&D activities, laboratories, and facilities.

That being said, we still have significant investments we need to make to continue to innovate on energy efficiency and renewable energy technologies, further bringing down their costs and making them even more beneficial to Americans. We have only begun to touch the surface of what these technologies can do, and our national labs, universities, and industry partners possess the expertise to explore them to their fullest potential. That's why this hearing is so important.

I am disappointed to hear that EERE has been unable to move hundreds of millions of dollars in grant funding out of the door, and to my knowledge, has even canceled some of those grant funding days before award finalists were to be announced. This does not sound like the type of support that our Nation's scientists, engineers, entrepreneurs, and industry leaders can rely on. If the United States is to become a global leader in clean energy, EERE needs to be sufficiently and responsibly funding R&D in these areas.

Beyond funding, it will take the coordinated work of EERE employees and our stakeholders to turn that vision into a reality. I join my colleagues in the House and Senate Appropriations Committees in their bipartisan concerns over EERE's staffing levels, which have reached new lows. We should be doing everything we can to ensure that EERE has the staff it needs to administer and

oversee federally funded research as effectively and efficiently as possible.

Constituents from Member districts on both sides of the aisle benefit greatly from this research, and we believe it is our duty to ensure the responsible use of our tax dollars. When it comes to these issues, this Committee has consistently demonstrated healthy, bipartisan collaboration. I've been appreciative of the many substantial energy research bills that we've advocated and advanced in this Congress with our colleagues across the aisle.

I am glad that Assistant Secretary Simmons could join us today and look forward to a productive discussion with our distinguished witness to learn more about how we can help with these management and spending challenges.

We can all agree that we are here to support EERE in its efforts to enhance U.S. energy productivity and our national competitiveness. Thank you, and I yield back.

[The prepared statement of Chairwoman Johnson follows:]

Good morning and thank you, Chairman Foster and Chairwoman Fletcher, for holding this joint hearing on oversight of the Department of Energy's Office of Energy Efficiency and Renewable Energy—also known as EERE.

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Thank you, and I yield back

Chairman FOSTER. Thank you. And the Chair now recognizes the Ranking Member for Subcommittee on Energy, Mr. Weber, for an opening statement.

Mr. WEBER. Thank you, Chairman Foster. I appreciate you holding today's joint subcommittee hearing. I'm looking forward to hearing from our witnesses about DOE's management of its clean energy research, development, demonstration, as well as its commercialization activities.

The Department's Office of Energy Efficiency and Renewable Energy, EERE, aims to make advanced clean energy technologies and services more available and reliable while lowering costs to both users and society as a whole. EERE is tasked as the lead Federal agency for clean energy research and development with programs in transportation, renewable energy, and energy efficiency. And on the Energy Subcommittee, we've held many hearings on this work in Congress.

So by now, we all know that after substantial growth during the Obama Administration, EERE is by far DOE's largest applied research program. With its fiscal year 2020 appropriated levels approaching $3 billion with a B in annual funding, EERE is bigger today than all of the R&D funding provided for, get this, fossil energy, nuclear energy, electricity, and cybersecurity combined. Let that sink in.

Our national debt, I don't have to tell you all, is at $23 trillion and rising. So any major Federal investment like what we are seeing in EERE deserves the Department's justification and full attention every single year. With so many of the taxpayers' dollars at stake, a blank check tied to a poorly defined list of priorities is just as wasteful as spending money on a failed project. Can you say Solyndra? Careful management of EERE's abundant resources should be a priority of the Department and of this Committee.

Let me be clear. I'm supportive of congressional oversight of DOE's R&D activities. It's our job, however, to make inquiries into the effective management of these programs, especially the higher-funded ones.

I'd like to take this moment to echo Ranking Member Norman's comments on today's oversight discussion. I believe today's inquiry misses the forest for the trees. And we all want more trees, right? But we don't want it to cause more misses.

After reviewing documents provided to this Committee, it is clear that the DOE has operated appropriately and within its mandate for responsible grant funding review. The Department did not withhold executed grants or cancel any promise. Simply stated, EERE simply did its job. And a key part of that job is to take the necessary time to faithfully review the benefits of potential grants to the Department and to ensure that they meet the mission goals as set forth by this current Administration. We simply can't afford to recklessly spend Federal money. Did I mention we've got a huge Federal debt and growing?

I applaud the Department's leadership on their attempts to develop fluid and clearly defined funding opportunities that advance energy innovation in line with their strategic plan. In fact, I would respectfully argue that finding additional opportunities for this

kind of goal optimization across the Department would be a better use of this Committee's time and oversight resources quite frankly.

It is imperative that we in Congress take a responsible approach to energy research and ensure that Federal investments go toward work that actually maximizes our investment in next-generation technology. To that end, this is going to mean we must make the best effort to focus Federal programs on innovative technologies that are not already commercially deployed and to take the long-term approach to address key national issues such as energy reliability, resilience, security.

I look forward to hearing from Assistant Secretary Daniel Simmons on the programs within EERE that are doing just that. Since his ceremonial swearing-in exactly one year ago tomorrow, happy anniversary tomorrow, Assistant Secretary Simmons has done an excellent job of focusing EERE's work on the overall mission goals of the Department set by the Secretary of Energy and the Trump Administration.

I hope we can have a productive conversation this morning about how we in Congress can continue to support them in that very mission to address America's energy challenges while supporting our national security and our prosperity.

Thank you, Mr. Chairman. I yield back.

[The prepared statement of Mr. Weber follows:]

Thank you, Chairman Foster and Chairwoman Fletcher for holding today's joint subcommittee hearing. I'm looking forward to hearing from our witnesses about DOE's management of its clean energy research, development, demonstration and commercialization activities.

The Department's Office of Energy Efficiency and Renewable Energy aims to make advanced clean energy technologies and services more available and reliable while lowering costs to both users and society as a whole.

EERE is tasked as the lead federal agency for clean energy research and development, with programs in transportation, renewable energy, and energy efficiency. And on the Energy Subcommittee, we've held many hearings on its work this Congress.

So by now, we all know that after substantial growth during the Obama Administration, EERE is by far DOE's largest applied research program.

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Our national debt is at $23 trillion and rising. So any major federal investment like what we are seeing at EERE deserves the Department's justification and our full attention each year. With so many of the taxpayer's dollars at stake, a blank check tied to poorly defined priorities is just as wasteful as spending money on a failed project. Careful management of EERE's abundant resources should be a priority of the Department and of this Committee.

That's why I want to be clear—I'm supportive of Congressional oversight of DOE's R&D activities. It is our job to make inquiries into the effective management of these programs—especially the highly funded ones. But I'd like to take this moment to echo Ranking Member Norman's comments on today's oversight discussion. I believe today's inquiry misses the forest for the trees.After reviewing documents provided to this Committee, it is clear that DOE has operated appropriately and within its mandate for responsible grant funding review. The Department did not withhold executed grants or cancel any promise, EERE simply did its job.

And a key part of that job is to take the necessary time to faithfully review the benefits of potential grants to the Department and ensure they meet the mission goals set forth by the current Administration.

We simply can't afford to recklessly spend Federal money. I applaud the Department's leadership on their attempts to develop fluid and clearly defined funding opportunities that advance energy innovation in line with their strategic plan.

In fact, I would respectfully argue that finding additional opportunities for this kind of goal optimization across the Department would be a better use of this Committee's time and oversight resources. It is imperative that we in Congress, take a

responsible approach to energy research, and ensure that federal investments go towards work that maximizes our investment in nextgeneration technologies. That means we must make the best effort to focus federal programs on innovative technologies that aren't already commercially deployed and to take the long-term approach to address key national issues of energy reliability, resilience, and security.

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Thank you and I yield back the balance of my time.

Chairman FOSTER. Thank you.

If there are Members who wish to submit additional opening statements, your statements will be added to the record at this point.

[The prepared statement of Mrs. Fletcher follows:]

Good morning and thank you to our witnesses for being here today.

Throughout this Congress, this Committee has demonstrated strong, bipartisan support for innovation in energy technologies that will both address the growing impacts of climate change and ensure that Americans are building and leading the industries of the future.

I believe I can speak for all of us when I say that we also have an obligation to ensure that taxpayer funds to address these critical missions are being managed wisely, and in accordance with law. But the Department of Energy's record in managing the various programs stewarded by its Office of Energy Efficiency and Renewable Energy over the last three years raises troubling questions.

First, how can the significant declines in EERE's staffing levels and overall expertise be reconciled with the significant increases in its budget over the last few years. Second, why has EERE been unable to spend such a historically large portion of its prior year funds for clean energy research activities despite clear Congressional direction on how these funds should be allocated. Third, we need a far better justification for why EERE would cancel a $46 million funding opportunity after already carrying out a rigorous merit review and selection process for hundreds of applicants from companies and universities across the country. Some of the best and brightest in our nation collectively spent thousands of hours developing and reviewing their applications. They deserve a clear explanation for why their time and resources were wasted by the Department.

I look forward to gaining a better understanding from the Department and our second distinguished panel of witnesses about how to best resolve these issues, and how to furtherenable EERE to achieve its mission to advance clean energy innovation as effectively as possible.

Thank you, I yield back.

Chairman FOSTER. At this time I'd like to introduce our first witness. Mr. Daniel Simmons is the Assistant Secretary for the Department of Energy's Office of Energy Efficiency and Renewable Energy. Assistant Secretary Simmons, you may now begin.

TESTIMONY OF MR. DANIEL SIMMONS, ASSISTANT SECRETARY, DEPARTMENT OF ENERGY'S OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

Mr. SIMMONS. Thank you. Chairwoman Johnson, Ranking Member Weber, the Subcommittee on Energy, Ranking—Chairman Foster and Ranking Member Norman of the Subcommittee on Investigations and Oversight, and Members of the Subcommittee, thank you for the opportunity to testify today, as well as thank you for the support, as we've heard in these opening statements, for EERE and EERE staff. That is very much appreciated.

Since 2019 when I was sworn in as Assistant Secretary, the Office of Energy Efficiency and Renewable Energy, EERE, has announced over $1.3 billion in competitive funding opportunity announcements, also known as FOAs, which advance America's economic growth and energy security while enhancing reliability and resilience of the U.S. energy system. We have also provided over $1.2 billion in funding to support research at our national laboratories, which play a central role in advancing America's leadership in scientific and energy development.

I'd like to begin by highlighting this morning's announcement of up to $125.5 million in new funding to advance solar energy research. In addition to this announcement, yesterday, EERE announced up to $43.8 billion to advance geothermal research and development. These funding opportunities, along with more than—along with $300 million in funding for transportation made last month, total more than $463 million, making this the largest amount of EERE funding made this early in the fiscal year in at least the past 6 years, which is to note that we take very seriously our responsibility to make sure the money is not just coming to the Department but it is also going out in funding opportunity announcements.

These recent announcements are a direct reflection of the EERE's intention to fully utilize its appropriated research funding to fund technologies and innovation consistent with congressional guidance and Administration priorities. We live in an exciting time for energy technologies with more competitive and affordable energy resources than ever before. To achieve this mission of creating and sustaining American leadership in the global energy economy, EERE works with groups across DOE and in some cases the world.

A great example of departmental coordination is the launch of the Energy Storage Grand Challenge announced earlier this year. The grand challenge is a comprehensive program to accelerate the development, commercialization, and utilization of next-generation energy storage technologies to sustain American global leadership in energy storage. The grand challenge builds on the $158 million Energy Storage Initiative announced in the President's FY (fiscal year) 2020 budget. In the fiscal year—in fiscal year 2020, EERE plans to spend $283 million to support this critical work.

In November 2019, DOE announced the plan—announced the launch of the Plastics Innovation Challenge, an EERE-led effort to accelerate innovations in energy-efficient plastics recycling technologies and develop new plastics that are recyclable—don't know why I just tripped up on that—recyclable by design. The innovation challenge will draw on both fundamental and applied research capabilities within the national laboratories, universities, and industry.

EERE's collaboration extends far beyond DOE. Earlier this week, DOE signed a memorandum of understanding between the United States and Norway to facilitate collaboration and leveraging of R&D advances in hydropowers—in hydropower between the two countries. This MOU is one example of recent EERE global collaboration, and it amplifies EERE's effort—reputation as a world leader in research and development of energy technologies.

All of this valuable work would not be possible without the dedication of our outstanding staff. EERE cares deeply about its staff and is actively working through the hiring process to recruit and hire additional talent. One of my top priorities upon confirmation was to address staffing needs within EERE.

In FY 2019, we ramped up our hiring efforts. We worked with DOE's Office of Human Capital to leverage the STEM (scientific, technical, engineering, and mathematics) direct hiring authority to recruit top talent for our engineering and scientific positions. EERE participated in a job fair last year from which we are able to extend over 20 job offers. In FY 2020 we have identified a staffing plan, and we are taking additional steps to reach 700—or 675 employees, as directed by Congress. We continue to make hiring a top priority.

We look forward to working with you to continue promoting affordable and reliable energy to enhance America's growth and energy security. Thank you for the opportunity to appear before the Subcommittee today and to discuss the Office of Energy Efficiency and Renewable Energy. Thank you for your time. I look forward to your questions.

[The prepared statement of Mr. Simmons follows:]

Testimony for the Record

The Honorable Daniel R Simmons

Assistant Secretary
Energy Efficiency and Renewable Energy

FOR A HEARING ON

Management and Spending Challenges within the Department of Energy's Office of Energy Efficiency and Renewable Energy

BEFORE THE
UNITED STATES HOUSE
COMMITTEE ON SCIENCE SPACE AND TECHNOLOGY
SUBCOMMITTEE ON ENERGY
AND
SUBCOMITTEE ON INVESTIGATIONS & OVERSIGHT

Wednesday, February 5, 2020
Washington, D.C.

Introduction

Chairwoman Fletcher and Ranking Member Weber of the Subcommittee on Energy, and Chairman Foster and Ranking Member Norman of the Subcommittee on Investigations and Oversight, and members of the Subcommittees, thank you for the opportunity to testify before you today.

As the Assistant Secretary of the Office of Energy Efficiency and Renewable Energy (EERE), I oversee a broad portfolio of renewable energy, energy efficiency, and transportation programs primarily focused on funding technology research and development through competitive solicitations open to the public as well as management and operations contracts with the National Laboratories, which play a central role in advancing America's leadership in scientific research and development. Knowledge generated by EERE research and development helps drive down the costs of new technologies, supporting the efforts of U.S. industries, businesses, and entrepreneurs in deploying innovative energy technologies. Affordable, reliable energy gives Americans the competitive edge needed to excel in the rapidly changing global energy economy.

In 2017, utility-scale photovoltaic solar achieved the U.S. Department of Energy (DOE) goal of 6 cents/kWh three years ahead of schedule, thanks in part to EERE-funded innovations. Since 2008, the cost of onshore wind has declined by 55%, electric vehicle battery costs have declined by 80%, and the cost of LED lightbulbs has declined by over 90%. These are a few examples of the significant cost reductions we've seen so far, and costs continue to fall.

I'd like to take this opportunity to reiterate my commitment to efficiently and responsibly execute congressionally appropriated funds.

EERE Highlights

During my time at DOE, appropriations for EERE have increased by 37%. Significant increases in appropriations can lead to challenges in execution; however, we are off to a great start in executing our record-high FY 2020 appropriations. We took immediate action and instituted a new planning process this year to expedite the release of funding opportunity announcements (FOAs) and better position ourselves to execute resources in a manner supportive of Administration priorities and consistent with Congressional guidance in conference report language as early as possible. We started this effort in FY 2019, when EERE moved almost exclusively to aggregating its FOAs into larger, multi-topic solicitations to streamline FOA development and issuance processes. In FY 2020, EERE has instituted a more rigorous scenario planning process to reconcile conflicting House and Senate marks in order to mitigate delay in finalizing our FOA topics after FY 2020 appropriations were enacted.

As a result of these efforts, on January 23, 2020, only 22 working days after the enactment of FY 2020 appropriations, DOE announced nearly $300 million in funding for research and development of sustainable transportation resources and technologies. This investment is split up between three separate FOAs, issued on behalf of the three transportation offices: the Vehicle, Fuel Cell, and Bioenergy technology offices. Just this week, we announced three additional

FOAs totaling $169 million in funding to advance renewable power technology research and development on behalf of the Solar Energy and Geothermal technology offices. This is the first time in at least six years that EERE has been able to announce such a large percentage of our FOAs so early in the fiscal year.

Last week, EERE issued a notice of intent (NOI) to release a $20 million FOA later this month to promote workforce development to prepare the next generation of scientists and engineers.

We expect to release the remainder of our FY 2020 FOAs in the coming months.

EERE's Commitment to Executing Funds

DOE fully intends to utilize its appropriated research funding to invest in new technologies and innovation consistent with both congressional guidance and administration priorities. The majority of prior year funds that we carried into FY 2020 are associated with competitive FOA awards that are under review or being actively negotiated.

EERE is making significant progress towards executing prior year funds. This progress was made possible by accelerating the release of our FY 2020 FOAs, and our progress will continue as we make additional upcoming announcements.

EERE Collaboration in DOE and Around the World

We live in the most exciting time for energy technologies in the history of the world, with more competitive and affordable sources of energy than ever before. But affordable energy does not matter if we cannot integrate these new sources of generation into the energy system. This is why EERE is focused on enhancing grid reliability and resilience through energy integration and storage.

A great example of this coordination is EERE's role in DOE's Grid Modernization Initiative (GMI). In November 2019, DOE announced the results of the 2019 Grid Modernization Lab Call with funding of approximately $80 million over three years. This funding aims to strengthen, transform, and improve the resilience of energy infrastructure to ensure the nation's access to reliable and secure sources of energy, now and in the future.

Another example of Departmental coordination is the launch of the Energy Storage Grand Challenge, announced earlier this year. The Grand Challenge is a comprehensive program to accelerate the development, commercialization, and utilization of next-generation energy storage technologies and sustain American global leadership in energy storage. The Grand Challenge builds on the $158 million Advanced Energy Storage Initiative announced in the President's FY 2020 Budget. In FY 2020, EERE plans to invest $283 million to support this critical work.

Last year, DOE announced the launch of a Lithium-Ion Battery Recycling Prize and a $15 million investment to establish the ReCell Center, an associated battery recycling R&D Center led by Argonne National Laboratory along with the National Renewable Energy Laboratory and

the Oak Ridge National Laboratory. These efforts aim to reclaim and recycle critical materials (e.g., cobalt and lithium) from lithium-based battery technologies used in consumer electronics, defense, energy storage, and transportation applications. The goal of the Recycling Prize and the ReCell Center is to develop technologies to profitably capture 90% of all lithium-based battery technologies in the United States. In September 2019, DOE announced the 15 winners of phase 1 of the Battery Recycling Prize.

In November 2019, DOE announced the launch of the Plastics Innovation Challenge, an EERE-led effort to accelerate innovations in energy-efficient plastics recycling technologies and develop new plastics that are recyclable-by-design. The Innovation Challenge will draw on both fundamental and applied research capabilities within the national laboratories, universities, and industry. Using a coordinated suite of funding opportunities, critical partnerships, and other programs, the Plastics Innovation Challenge sets five goals for the United States to reach by 2030, including: promoting the collection, deconstruction, upcycling, and design of plastics for recyclability; and commercialization of a domestic plastics upcycling supply chain. EERE is leading the Plastics Innovation Challenge in collaboration with the Office of Science and other DOE programs.

On January 29, 2020, EERE announced the American-Made Geothermal Manufacturing Prize. A first of its kind for geothermal technology, this prize is designed to spur innovation and address manufacturing challenges fundamental to operating in harsh geothermal environments. This prize further supports the ability of the geothermal industry to reach the potential 60 Gigawatts electric of geothermal capacity by 2050 as projected in the recently released *GeoVision* study. The Geothermal Prize is led by EERE's Geothermal Technologies Office and Advanced Manufacturing Office, and is administered by the National Renewable Energy Laboratory in partnership with the Oak Ridge National Laboratory on the American-Made Challenges platform.

EERE's collaboration extends far beyond DOE. Earlier this week, DOE signed a Memorandum of Understanding (MOU) between the United States and Norway to facilitate collaboration and leveraging of R&D advancements in hydropower between the two countries.

This MOU is just one recent example of EERE's global collaboration, and it amplifies EERE's reputation as a world leader in the research and development of energy technologies.

EERE Staffing Update

All of this valuable work would not be possible without the dedication of our outstanding staff. EERE cares deeply about its staff and is actively working through the hiring process to recruit and hire additional talent. One of my top priorities upon confirmation was to address the staffing needs within EERE. In FY 2019 we developed a staffing plan to reach 625 full time equivalent employees. We worked with DOE's Office of Human Capital to leverage the STEM direct hiring authority to recruit top talent for our engineering and scientific positions. EERE participated in a job fair in June 2019, from which we were able to extend over 20 job offers.

Upon enactment of the FY 2020 appropriations, we immediately started to refine our staffing plans to identify the critical positions required to execute our increased budget. EERE recently started a campaign to reach out to our stakeholder groups and identify prospective employees eligible to be hired through the STEM direct hiring authority. EERE continues to partner with Human Capital to accelerate the posting of additional vacancy announcements for EERE's non-technical positions.

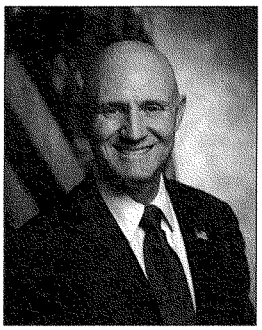
EERE's staff remains committed to executing the mission, as evidenced by the 5.8% increase since 2016 in global satisfaction as reported in the Federal Employee Viewpoint Survey. We continue to make hiring a top priority.

Conclusion

I look forward to working with you to continue promoting affordable and reliable energy to enhance America's growth and energy security. Thank you for the opportunity to appear before the Subcommittees today to discuss the Office of Energy Efficiency and Renewable Energy. I look forward to your questions.

Daniel Simmons

Assistant Secretary for Energy Efficiency and Renewable Energy



In his role as Assistant Secretary for the Office of Energy Efficiency and Renewable Energy (EERE), Daniel R Simmons leads EERE to promote affordable and reliable energy to enhance America's economic growth and energy security. He oversees technology development in the energy efficiency, renewable power and sustainable transportation sectors.

Before joining the U.S. Department of Energy, Daniel served as the Institute for Energy Research's Vice President for Policy, overseeing its energy and climate policy work at the state and federal level.

He previously served as the director of the Natural Resources Task Force of the American Legislative Exchange Council, was a research fellow at the Mercatus Center and worked as professional staff on the Committee on Resources of the U.S. House of Representatives.

He is a graduate of Utah State University and George Mason University School of Law.

Chairman FOSTER. Thank you. And we will now start our first round of questions, and the Chair recognizes himself for 5 minutes.

Mr. Simmons, EERE told my staff that the staffing count at the end of September was 553. This is actually one fewer than the number that we heard in July even though we'd heard at the time that EERE was working hard to get more people on board. Do you have an updated figure on what the staff on board is today?

Mr. SIMMONS. That's—that number is roughly accurate. I mean, it's——

Chairman FOSTER. Still five——

Mr. SIMMONS [continuing]. It's accurate——

Chairman FOSTER. Still 553——

Mr. SIMMONS [continuing]. Within a couple——

Chairman FOSTER [continuing]. Approximately?

Mr. SIMMONS. Approximately, yes.

Chairman FOSTER. OK. Now, DOE was instructed in the fiscal year 2020 appropriations package signed into law by President Trump, I believe, on December 20th to generate a report within 30 days on how you plan to achieve a staffing level in the range of 675 to 700. Can we see this report?

Mr. SIMMONS. Well, we are producing that briefing to——

Chairman FOSTER. Have you seen this report at least in draft form?

Mr. SIMMONS. No. We are working on it.

Chairman FOSTER. So you have not yet seen this report personally even in draft form?

Mr. SIMMONS. Not seen it. We are working on putting it together, yes.

Chairman FOSTER. All right. Do you have an estimate for when—how much longer we'll have to wait for something that should have been here a couple weeks ago?

Mr. SIMMONS. Within the next few weeks we should have this together, and we will be briefing obviously appropriations staff. We will be—our plan is also to include the Office of Human Capital to make sure that we have a holistic DOE perspective on our hiring—one, our hiring challenges, and two, how we can——

Chairman FOSTER. Can you simply say whether you're actually committed to achieving the goal?

Mr. SIMMONS. Oh, yes. Yes.

Chairman FOSTER. Well—all right. Well, that would—you know, that would be really valuable, and we really intend to hold you to that commitment.

And, you know, we have—you have several things in your toolkit to actually increase. It's my understanding that EERE has actually abandoned the Presidential Management Fellows program in recent months. The PMF program is designed to put highly talented young people with advanced degrees in a demonstrated leadership ability and to serve in Federal agencies. Is that something you may consider, restoring that program by taking on new PMFs and offering placements to PMFs who've completed fellowships successfully?

Mr. SIMMONS. Yes.

Chairman FOSTER. All right. On October 2018 the OPM put out new guidance for Federal agencies that would allow hiring to move more quickly for positions specifically in science, technology, engi-

neering, and mathematics, STEM fields. It seems like the majority of EERE needs would fit into the STEM bucket. Has EERE taken advantage of this special hiring authority to try to get more employees in place?

Mr. SIMMONS. Yes, we have.

Chairman FOSTER. All right. And why have you not been effective at using this authority? And how many employees have you actually placed with this special authority?

Mr. SIMMONS. Well, I'll have to get back with you on the exact numbers. Last year when we had the job fair, that is the authority that we used at the job fair to extend the over 20 offers from that—from that outcome——

Chairman FOSTER. So over 20 offers, how many people are on board as a result of that?

Mr. SIMMONS. I don't have those numbers right now. We'll have to get back you with you on those specific numbers.

Chairman FOSTER. So the difficulty you're encountering is that people may be extended offers but don't in the end take them. Do you find that when you're trying to recruit people, there is an obstacle in place that the Administration's position is to largely or substantially defund EERE and it wouldn't really be a very good place to be hired into?

Mr. SIMMONS. I have not heard that and plus I push back on that in that what matters at the end of the day is appropriated dollars. The President's proposed budget comes out as the beginning of the process——

Chairman FOSTER. No, I understand that——

Mr. SIMMONS [continuing]. The beginning of negotiation, but——

Chairman FOSTER. —Congress is in charge of final appropriations. I understand that very clearly. And our—one of the sources of our unhappiness here is that when we make a clear statement that we want something, you know, funded at a certain level, we expect that executed in good faith. And, you know, there is—it's unclear to many of us that there has been a completely good-faith effort in all of the areas. Many of the areas I think you—as you correctly point out, you've done an excellent job, but there are areas where I perceive that you've fallen short, and that will be the subject——

Mr. SIMMONS. May I make one comment? From my perspective this has been a very good-faith effort. As you noted, we have fallen short. It is not a—it's not because of good faith.

Chairman FOSTER. No, I understand the decision to improve—approve both the position descriptions and the decision for who to actually hire for these positions must go before the Under Secretary for Energy or even the Secretary himself. Even junior-level positions, as I understand it, must go through this additional step that's new in this Administration. Is that a correct statement?

Mr. SIMMONS. Well, the process is that we have internal approvals at EERE. They then get sent to Human Capital. Human Capital then takes care of any other additional approvals in the process. There could be additional approvals in the process, so that——

Chairman FOSTER. There could be——

Mr. SIMMONS. But let me——

Chairman FOSTER. But are those——

Mr. SIMMONS. But let me also say——

Chairman FOSTER. Anyway, I'm out of time here, but I will return to this question——

Mr. SIMMONS. OK.

Chairman FOSTER [continuing]. Because this seems like——

Mr. SIMMONS. Yes. No——

Chairman FOSTER [continuing]. An unnecessary new feature.

Mr. SIMMONS. Happy to do that.

Chairman FOSTER. All right. Thank you. And I now yield to the Ranking Member.

Mr. NORMAN. Thank you, Chairman Foster. And, Mr. Simmons, let me say, and I think Congressman Weber alluded to this, we'd be derelict in our duties if we didn't question the funding. We're $22 trillion in debt. We do this in our businesses. We do this in our budgets. Any responsible elected official should be doing this.

The specific topics that we've discussed today is management and spending challenges within the EERE. These include the upper trend and carryover balances, staffing levels and revision of a fiscal year 2018 funding opportunity announcement. Can you describe the actions EERE has taken since your confirmation to address on a macro level each of these issues?

Mr. SIMMONS. In terms of carryover, one of the—you know, we have carried over a—consistently about—you know, if you were to—so in fiscal year 2020 we carried over about 35 percent of our prior-year funding to fiscal year 2020. In fiscal year 2016, which is the previous Administration, they carried over 35 percent. To fiscal year 2017 they carried over 37 percent. Like we are roughly in line. And the reason for that is it takes a while to do—to go through the entire FOA process. We are trying to be good stewards of taxpayer dollars. When Congress does not appropriate, you know, final year appropriations till later in the fiscal year, it takes a while to get the—those funding announcements out the door. It then takes at least 9 months before we can make selections. So that is—that's a part of the challenge. It is the process.

In terms of staffing, I will state that it is—staffing is a harder challenge than I thought that it was a year ago, and we are continuing to take actions working with Human Capital to make sure to the best of our ability that our—the people that work on EERE positions in Human Capital are given the resources that they need to be able to get those jobs posted. There's over 70 positions that are currently in process as in have been signed—there's no more approvals in terms of the building that needs to happen for these 70 positions where it is—17 offers have been extended, 22 positions are in the interview and selection process, an additional 35 selections are with Human Capital for processing.

There's currently four open announcements, which does not sound like a lot, but it is more than there's been in years. What I'm trying to say is we take this issue very seriously of staffing because what matters to me from a staff perspective is the staff is able to execute on the moneys that Congress has provided. And when we have fewer staff, that is more challenging.

So I don't remember if there was something else in your question that I should answer.

Mr. NORMAN. OK. Thank you. And as Co-Chairman of the Solar Caucus, I'm fully aware of the benefits that renewable energy solutions can have on consumers' businesses and on the environment. Nevertheless, I do not believe that it is appropriate for the Federal Government to pick winners and losers in the market. How does EERE ensure that it is not picking winners and losers in the market while simultaneously fulfilling its mission to support the United States' leadership in the global clean energy economy through the many research and development initiatives?

Mr. SIMMONS. Two ways. First of all, there is an emphasis on early stage research. On early stage research, particularly things such as materials research that is—that is precompetitive research. That is research that we think can help all parties in the solar area. Also that the—the funding opportunity announcements, when they—when those go out, by focusing on early- to mid-stage and then partnering with the private sector for later stage, we are working through that process so we're not—we're not trying to pick a winner and loser for the company but advancing technology. And so by focusing on advancing technology, I think that that helps us do a good job of not picking winners and losers.

Mr. NORMAN. Well, I want to applaud your efforts in that because, yes, the private sector is the competitiveness that is what made this country so great that this President is trying to get through a Congress that has been unwilling to listen to many of them. I'm running out of time. I yield back, Mr. Chairman.

Chairman FOSTER. Thank you. And the Chair will now recognize Mr. Beyer for 5 minutes.

Mr. BEYER. Thank you, Mr. Chairman, very much. Mr. Simmons, thanks for being here with us.

The first question I had is—maybe I'll walk you through the process as I understand it that when DOE decides who should win a competitive grant, it conducts a merit review in which applications are evaluated and scored against specific preestablished merit review criteria and program policy factors, so I imagine all of those are capitalized. Is that correct from your perspective?

Mr. SIMMONS. We would go back before that to the—when the funding opportunity announcement comes out, the funding opportunity announcement has the topics, as well as the criteria in the very beginning.

Mr. BEYER. And then these reviews are performed by internal or external reviewers with knowledge and expertise, technical and scientific fields?

Mr. SIMMONS. Both, as in there is an external merit review panel, as well as a Federal panel that reviews——

Mr. BEYER. And then they submit their recommendations with numeric scores, too, to the designated selection official, again, capital——

Mr. SIMMONS. Correct.

Mr. BEYER [continuing]. Capital O, to make the official award decision.

Mr. SIMMONS. Correct.

Mr. BEYER. So my concern is in your tenure have EERE political appointees ever stepped in to change the award selections after the merit review?

Mr. SIMMONS. I don't know of a specific case. What—there is a part of the process that you did not—that was not included that the selection officials briefs me on the—you know, on the process, and I talk through the process of how they selected the officials. But I can't think of a—like in my experience of changing one of those selections.

Mr. BEYER. OK. And I just want to make clear that our concern as Democrats and Republicans would be when political ideological concerns come and override the merit review of the scientific and technical profession.

Mr. SIMMONS. And that's something I take very seriously, that responsibility, because the—I definitely do not want to be in a situation of having political—those decisions made for political reasons.

Mr. BEYER. Great. Thank you. We've talked a lot about the $824 million postponed, but we also have—DOE has now missed 21 legally mandated deadlines for 21 energy efficiency standards. And in your testimony in front of the Energy and Commerce Committee nearly a year ago you committed to meeting those legal obligations, but DOE continues to miss the deadlines. What's happening with these legally mandated standards, and how—what are you going to correct this lapse?

Mr. SIMMONS. Well, since July 1—or—July—January 1 of last year, we have published 26 notices relating to energy conservation standards, including 7 final and 14 notices related to test procedures. Over the next 6 months we plan to issue 34 notices related to energy conservation standards, including 2 final rules and 29 notices related to test procedures, including 4 final rules.

Congress should receive a—you are due a report to Congress on the status of the Appliance Standards Program. It is currently in agency review, but that report should be sent to Congress.

Mr. BEYER. OK. Thank you. And we just—as Members of the Oversight Committee want to keep the pressure on you, so——

Mr. SIMMONS. Thank you.

Mr. BEYER. Mr. Assistant Secretary, too, you know, one of the concerns that, for example, my friend Mr. Norman talks about is the—making sure that the private sector continues to do this. But the Appropriations Committee in Congress has made clear that they want EERE not to just do early stage but also mid-stage and late stage. But the concern is that you—structurally, you've been pushing back to early stage only. Is department leadership giving you direction to steer away from mid- and late-stage R&D to focus on early stage?

Mr. SIMMONS. No. The—you know, the memo that comes out every year from OMB states to focus on early stage R&D. Then, Congress also has in the—in appropriations report language instructs us to be working all across from early to late stage. We think that—you know, we're trying very hard to find the appropriate balance of all of those, and we have funded just recently some demonstration projects. We are—we take this—let's call it a challenge of working from late to kind of middle to late and demonstration—we take that challenge seriously and are working very hard to be able to have the—to move the work along appropriately so that, you know, these technologies—these technologies cannot

stay in the national labs, for example. We need to get them into the real world.

Mr. BEYER. Great. But we just want to make sure that you're committed to——

Mr. SIMMONS. Yes.

Mr. BEYER [continuing]. Following the congressional——

Mr. SIMMONS. Yes.

Mr. BEYER. Great. Great. Thank you, Mr. Chair. I yield back.

Chairman FOSTER. The Chair will now recognize the gentleman from Texas, Mr. Weber.

Mr. WEBER. Thank you, Mr. Chairman.

Assistant Secretary Simmons, today, renewable energy sources are becoming an integral part of the U.S. electricity generation mix. This increase is almost entirely due to the incorporation of additional wind and solar power. And I'm quite frankly pleased to see American industry leading the way in supporting the growth of these clean-energy technologies. You're probably aware Texas is No. 1 in wind energy and No. 5 in solar panels.

So my question to you is what are you going to do to see to see that Texas gets to be No. 1 in solar panels? No, no, no, that's not it.

However, as our energy portfolio continues to diversify, I'm very concerned about the security and the reliability of our Nation's electric grid. As you know, Texas has 85 percent of ERCOTs (Electric Reliability Council of Texas) and its own electric grid, very, very concerning to us. So as more more renewable energy technologies come online, how significant is the need for Federal R&D dollars into grid resiliency and cybersecurity in your opinion?

Mr. SIMMONS. This is a very important topic. This is one of the reasons that Secretary Perry stood up the new Cybersecurity—the Office of Cybersecurity and Emergency Response to, one, demonstrate the level of commitment the Department has in terms of cybersecurity. The Office of Electricity has a laser-like focus on improving resiliency, protecting defense-critical energy infrastructure. These are two critical areas.

And one of the things that matters for me as the head of EERE is to make sure that my offices are coordinating with those offices. This is—that collaboration is critical to make sure that we're working together across the DOE to promote these—like—these incredibly important topics.

Mr. WEBER. Well, thanks for saying that. My next question was as Assistant Secretary how do you collaborate with DOE's relevant offices like Office of Electricity, Office of Cybersecurity, Energy Security, and Emergency Response? And I think, quite frankly, what you're saying here today is that, as part of that good-faith effort you were describing to the Chairman earlier on that you're doing everything you can to make that work together.

Mr. SIMMONS. I am. When—like it is something that I talk about when we have all-hands meeting, this need for collaboration. The need—the future of energy is not at all clear. There is going to be a lot of changes that we see in the future, and so one of the things that matters that we are collaborating across the offices in EERE and that we are collaborating across DOE because no matter what happens, that's a win-win, you know, if the cost of wind continues

to come down, the cost of solar, so we need to be collaborating across the Department.

And when we work on FOAs and—that it—is on something that touches the grid or touches cybersecurity, it's one of the things that I ask the staff—try to every single time, what have we done to work with the Office of Electricity or the Office of Cybersecurity and Emergency Response on this topic because—to demonstrate that needed collaboration.

Mr. WEBER. Well, thank you for saying that. As Ranking Member of the Subcommittee on Energy, I believe that we need to take that balanced and responsible approach to energy research and ensure that Federal investments go toward work that truly could not be accomplished by the private sector. And I'm encouraged to hear that you work with the other agencies as well.

So as I mentioned in my opening statement, it is up to Congress to wisely invest taxpayer dollars in fundamental research that lays the foundation for the next generation. So in your opinion what areas of fundamental research and development within EERE are expected to lead to technological breakthroughs in renewable energy and energy efficiency? You got anything on the horizon?

Mr. SIMMONS. A couple areas I think are really important. One is fundamental materials research around solar energy. What are the next-generation materials where we can really see improvements? Also, the fundamental research of battery materials, that's—that is critically important. Lithium-ion batteries are great, but we would like to see energy storage that is even better than that where we have more dense storage at lower cost.

And then a third area generally is early stage research on critical—on the critical materials challenges such as rare-earth elements, what can we do in terms of separations and processing so that those supply chains are more in the United States and more with our, you know, trusted partners around the world because so many of those only run through China. And so it's an important materials question and how we can do a better job of dealing with those issues because those materials are critical for future energy technologies.

Mr. WEBER. Thank you for that. Mr. Chairman, I yield back.

Chairman FOSTER. Thank you. And the Chair will now recognize the gentleman from Illinois, Mr. Casten, for 5 minutes.

Mr. CASTEN. Thank you, Mr. Chairman. Thank you, Mr. Simmons. Excuse me.

You mentioned a moment ago that the future of energy is hard to predict. Having spent 20 years in the sector, I kind of disagree with you. It's really easy to predict what's happening in the energy sector. It's just hard to predict the timing. It's big and capital-intensive, and you can see things coming.

But I'd also point out Abraham Lincoln's great line that the best way to predict the future is to create it. And particularly given as the recently departed Secretary of Energy campaigned on eliminating the Department of Energy, you understand why we want to understand the future you're trying to create.

And, historically, as you pointed out a moment ago, there's the political level staff, and then there's the exceptional career staff. And I want to understand, following on Mr. Foster's comments,

some of the decisions you've made. Can you confirm that at this point either the Under Secretary or Secretary must sign off on all position descriptions and hiring decisions within EERE?

Mr. SIMMONS. There are some positions that I believe that I have the authority to sign off on. I would have to—like any specifics there I would have to get back with you on.

Mr. CASTEN. Well, if you could clarify because my understanding in the Obama Administration is that anything GS–15 or below was done at the Assistant Secretary level. What is your explicit guidance for what level you can approve and at what level you have to go to the Secretary or Under Secretary?

Mr. SIMMONS. So I'd have to get back to you on that because I can't remember what that—where that level is crossed.

Mr. CASTEN. Do you believe it's consistent with what it was in the Obama Administration or has it been moved?

Mr. SIMMONS. I think it is—I think it's been moved, but I don't know—I don't know what——

Mr. CASTEN. Moved lower or higher?

Mr. SIMMONS. It could be lower, but again, that is—that would be speculation. I can't really speculate on that.

Mr. CASTEN. Do you know why it was moved?

Mr. SIMMONS. No.

Mr. CASTEN. Do you have a concern that allowing even junior staff to be approved by senior people could risk politicizing your staff?

Mr. SIMMONS. No. Currently, there are over 70 hiring actions that are currently in process. The issue of those type of approvals is not the—is not our hiring challenge.

Mr. CASTEN. When you——

Mr. SIMMONS. There are other parts of the process that are the hiring challenge.

Mr. CASTEN. Well, look, I was a CEO for 16 years. Hiring processes take time. The more people you have reviewing, the longer time it takes to get it done, so I'm part of this is the—is who is getting hired. The other process is delays. So when you recommend someone and send it up the chain, how long does that process take for you to get an answer?

Mr. SIMMONS. An answer for——

Mr. CASTEN. For a hiring decision. Do you make recommendations to the senior staff, or do those bypass you completely?

Mr. SIMMONS. I'm not exactly—not exactly sure what you're asking. What happens is that we develop a staffing plan. We identify vacancies within EERE. We then go through the internal EERE approvals, and those get sent to our Human Capital Office.

Mr. CASTEN. And when—and just when you say "we," is that at your level and below?

Mr. SIMMONS. Yes——

Mr. CASTEN. Who is——

Mr. SIMMONS [continuing]. That is the "we," but I sign off on every single hiring action within EERE. I sign off on new hiring actions every single week. Every month that—we then send those along to the—to Human Capital and the rest of the process.

Mr. CASTEN. And for any of those people do you have the authority to make a unilateral decision or do you need a permission slip?

Mr. SIMMONS. When it comes to like what that actual approvals are, we approve, but, you know, one clarifying thing here is like we approve positions. We don't approve, you know, who is going to be hired in those—for those career positions.

Mr. CASTEN. In June, this Committee asked EERE to share with us the written workflow for hiring decisionmaking in EERE. We have not yet received anything back. Can you commit to when you will share that information with us?

Mr. SIMMONS. I will commit to finding out where that is and what the situation is.

Mr. CASTEN. By when?

Mr. SIMMONS. Well, as soon as practicable. I mean, I don't know if I can commit the Department to more than that.

Mr. CASTEN. Is this a written policy? Do you know what the policy is?

Mr. SIMMONS. I do not know what all of our written policies around hiring are.

Mr. CASTEN. So, respectfully, do you understand the Department's hiring policy? I mean, this is—I get it if you might not know it right now, but I can't imagine running an organization your size and not having a written hiring policy.

Mr. SIMMONS. Well, it would—come work for the Federal Government——

Mr. CASTEN. I do.

Mr. SIMMONS. The Federal hiring——

Mr. CASTEN. I can give you the hiring policy in my office tomorrow. I have it. I run a much smaller organization than you do.

Mr. SIMMONS. Thank you.

Mr. CASTEN. It is not hard.

Mr. SIMMONS. It is——

Mr. CASTEN. Can you commit to a time to provide this——

Mr. SIMMONS. And all of your employees are political appointees, and that's the challenge is dealing with the—dealing with the—all of the hiring policies that it is—it is extensive, so I——

Mr. CASTEN. Are you satisfied with the pace of hiring?

Mr. SIMMONS. No, not at all. I'm quite frustrated with it. You know, I would—there's—there are many other things I would like to be doing than being here today at an oversight hearing talking about this issue, but the value is that I am frustrated about the pace of hiring. I generally thought that it would—you know, that the process would not take this long. I am committed to working to do a better job. There are steps in the process that I have learned in preparing for this—preparing today that we are going to go back, and we are going to go work on smoothing out those processes.

Mr. CASTEN. I'm out of time. We're trying to help you. Please respond to the request we gave you in June. Please provide it in a timely fashion, and please let us know precisely at what level you have authority and what level you need permission slips so that we can try to fix it.

Mr. SIMMONS. OK.

Mr. CASTEN. Thank you. I yield back.

Mr. SIMMONS. Thank you.

Chairman FOSTER. Thank you. And the Chair will now recognize the gentleman from Indiana, Mr. Baird, for 5 minutes.

Mr. BAIRD. Thank you, Mr. Chairman. And, Mr. Secretary, I appreciate you being here today.

I think the question I have at this point are what are some of the challenges that you feel that the EERE is going to face when we're trying to reach the number, the 675 to 700? And then could you relate how the STEM education program, the internships, the research opportunities at DOE assist in attracting these kind of individuals?

Mr. SIMMONS. Sure. As was noted earlier, our hiring—our onboard count is very similar today than what it was when my staff briefed the subcommittee staff last June. That is frustrating. I would like to have a better story to tell on hiring than that. We need to do a much better job, and we will—and we have done some—we have taken some actions such as hiring fairs, which making sure that we are spreading the word as widely as possible about open positions. We will continue to.

But what a lot of it comes down to is the processing that goes through not only Human Capital but other parts of the onboarding process such as—things such as badging, which might not sound like it is an issue but can actually like add time to the process. And that is something that we are going to go back and discuss and find out what we need to do to facilitate that process because we have not done a great job in the last year, and I want to do a much better job in this year. So it is—yes.

So I'm a bit frustrated about that because there's only certain parts that are in my control. We have, you know, 70 actions that are fully approved that are moving through the process, and I would like as much as possible to facilitate that.

And I—with that, I—oh, the—one of the things that the offices have done that I'm very grateful is to use all of their hiring authorities, bringing on certain—some fellows such as AAAS (American Association for the Advancement of Science) fellows. I met a large number of AAAS fellows. Every month, we try to have lunch with the staff, whoever wants to come and have lunch with me, and there's always a very good turnout from the AAAS fellows.

And it is—you know, that's one of the things to see these people early in their career and to hear what they're excited about because one of the things that I want to make sure with the staff at EERE is that it continues to be excited about our mission. I think that the staff at EERE is incredibly dedicated to the mission of the Department and the mission of EERE. And it is—it's, you know, one of my goals to keep it that way.

Mr. BAIRD. You might make one comment if you would about, you know, we're putting a lot of emphasis on STEM education programs and encouraging the ability to fill that pipeline, to get employees like you're looking for. Any thoughts in that regard that you see what your observations might be?

Mr. SIMMONS. Sure. Two things there. We do have some direct hiring authority for certain STEM positions. We want to use that to its—we want to use that authority to its fullest to make sure that we are getting good candidates in EERE, making sure that the—you know, that the technical staff, the program offices are

well-staffed because that is our least burdensome way of hiring people.

Also, because STEM is critical in the very near future, we should be coming out with a $20 million effort to—that's not to hire Federal staff, but a $20 million effort in terms of hiring—not hiring but in terms of STEM education that was also in the most recent budget, to highlight the importance of that. Plus our offices, our individual offices such as the office—our Water Power Technologies Office and others are going to have additional work on STEM as well to make sure that we are doing everything we can in that area.

Mr. BAIRD. One quick question, and I only got about 22 seconds, so, anyway, I'm interested in agriculture and the trucking industry. Any comment about the biofuels and what you're doing in that area?

Mr. SIMMONS. Well, that—one quick thing is on the solar FOA that just came out today, there's an interesting topic about solar and—solar and agriculture, looking how we can do a better job combining those two things in terms of trucking, heavy-duty trucking is an important area, looking at what that looks like in terms of electrification, in terms of using other fuels, in terms of bioenergy. Our Bioenergy Technologies Office I think is working on a lot of exciting—a lot of exciting areas. The—just last week I was at Lawrence Berkeley National Laboratory reviewing some of our work there participating in a summit on biomanufacturing and our Bioenergy Technologies Office is really leaders in this area.

Biofuels have been somewhat of a challenge. We haven't been able to accomplish what we, you know, hoped we would 10, 15 years ago in terms of the efficiency of some of those fuels. But we're making progress.

Mr. BAIRD. Thank you very much. And I yield back.

Chairman FOSTER. Thank you. And the Chair will now recognize the gentlewoman from Oregon, Ms. Bonamici.

Ms. BONAMICI. Thank you to the Chairs and Ranking Members, and thank you to our witnesses for being here today.

I came to this hearing from a hearing in the Select Committee on the Climate Crisis. I know that the climate crisis is a—one of the greatest existential threats of our time, and I'm extremely concerned by this Administration's attempts to disregard congressional intent when spending or delaying this spending of appropriated dollars on clean energy research, development, and demonstration, which are all part of the—going to be part of the solution to addressing this crisis.

And in fact the Department doesn't have a great record. In 2017 the GAO found that the Department had violated the Impoundment Control Act regarding the distribution of the ARPA-E funds. So, Mr. Simmons, are you aware that Secretary Perry testified before this Committee in June 2019?

Mr. SIMMONS. I'm—I would imagine that I knew that at the time, but I have no recollection of that specific hearing.

Ms. BONAMICI. Well, are you aware that during that hearing then-Secretary Perry committed to distributing the Department's appropriated funds for fiscal year 2019 and fiscal year 2020 in accordance with congressional intent?

Mr. SIMMONS. I know that Secretary Perry has always been very clear about distributing funds consistent with congressional intent.

Ms. BONAMICI. Thank you. And has the Department distributed appropriated funds for fiscal year 2019 in accordance with congressional intent?

Mr. SIMMONS. I believe so.

Ms. BONAMICI. Do you know so?

Mr. SIMMONS. Well, as an in my office, which I can't really speak to other offices because I don't know all of the situations, we have worked very hard to comply with congressional intent.

Ms. BONAMICI. We appreciate that certainly. According to testimony from one of our witnesses from the Natural Resources Defense Council on our second panel today, which I hope you'll be able to listen to if you haven't already reviewed the testimony, the Office of Energy Efficiency and Renewable Energy entered FY 2020 with $820 million of unobligated funds from previous years. So that's equivalent to nearly 1/3 of the office's annual budget. Do you agree with that figure? Is that correct?

Mr. SIMMONS. It's close. It's 35 percent of our budget.

Ms. BONAMICI. OK. But $800—about $820 million of unobligated funds?

Mr. SIMMONS. Yes, $835.

Ms. BONAMICI. In your testimony you're quick to point to examples of EERE issuing large FOAs totally millions of dollars, and you suggest you will release the remainder of your FY 2020 FOAs in the coming months. How can this Committee be certain that the Department is deliberately allocating these dollars consistent with congressional intent and scientific integrity principles rather than with the President's goals, as outlined in his budget request?

Mr. SIMMONS. To that I think is just to say look at our track record in terms of unobligated funding. Our track record, you know, for fiscal year—coming into fiscal year 2020 is consistent with the previous Administration's unobligated funding going into fiscal year 2016 and fiscal year 2017 in terms of the funding opportunity announcements themselves. Those topics are very much aligned.

When the program directors come and brief me on upcoming FOAs, one of the things that is discussed every single time about every single topic is what is the congressional language around this topic? You know, why are we doing this topic? I take very seriously that—you know, that direction from Congress and want to make sure that we are allocating funding and our funding opportunity announcements are consistent with—you know, with that direction from Congress.

Ms. BONAMICI. I appreciate that response, but it seems inconsistent with having $820 million of unobligated funds that could be used for research and development that we so desperately need.

Mr. SIMMONS. The—from the—from the time of—from a FOA is released, it takes about 9 months till we have the first award of that funding opportunity announcement. That means that when we get kind of—when we get to later in the fiscal year, we're going to have some carryover. We're going to have some carryover money into the next fiscal year just because it is a—it takes a while to go through that process to have—for applications to come back, to

have the merit reviews, and then to go through the award process because even after we have selected the winners, it then takes time for—to negotiate the—to negotiate the actual award.

Ms. BONAMICI. Well, I——

Mr. SIMMONS. Unfortunately, that is longer than I would—longer than I would wish, but it does take 9 to 12 months frequently.

Ms. BONAMICI. And I do want to just—and—as I yield back express my concern about this situation where the Department of Energy withdrew and then reissued the—with regard to the advanced solar energy technologies. And I know there's some documentation that's likely to be included in the record in this.

And I yield back the balance of my time.

Chairman FOSTER. Well, I'd like to thank our witness for his testimony. At this point we look forward to the follow-up that you've committed to, the follow-up information.

And we will now have a short 5-minute break while we seat our next panel of witnesses.

Mr. SIMMONS. Thank you.

[Recess.]

Chairman FOSTER. Well, welcome back. At this time I would like to introduce our second panel of witnesses.

First, we have Dr. Charles Gay. Dr. Gay is a member of the Sandia National Laboratory Energy and Homeland Security External Advisory Board. Formerly, he served as the Director of the Solar Energy Technologies Office (SETO) at the Department of Energy's Office of Energy Efficiency and Renewable Energy.

Next, Mr. Anthony Reardon. Mr. Reardon is the National President of the National Treasury Employees Union.

And last, we have Mr. Arjun Krishnaswami, a political—a policy analyst and—for the Climate and Clean Energy Program at the National Resources Defense Council. And we will start with Dr. Charles Gay.

TESTIMONY OF DR. CHARLES GAY, MEMBER, SANDIA NATIONAL LABORATORIES' ENERGY AND HOMELAND SECURITY EXTERNAL ADVISORY BOARD, AND FORMER DIRECTOR OF THE SOLAR ENERGY TECHNOLOGIES OFFICE, DEPARTMENT OF ENERGY'S OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

Dr. GAY. Thank you, Chairman Foster and Ranking Member Norman, Chairman Fletcher, Ranking Member Weber, Chairwoman Johnson, and Ranking Member Lucas, and distinguished Members. Thank you for the opportunity to testify today. As you know, I appear pursuant to subpoena. I am committed to cooperating fully and truthfully. I will provide facts as I understand them and as I've been refreshed by having had access to redacted information produced by the Department of Energy under Freedom of Information Act discovery, which is available online. I'm speaking today as an individual with 45 years of experience in renewable energy, including 3 years at the solar energy office. I'm speaking on the basis of personal experience and do not represent the views of, nor am I speaking on behalf of Sandia National Laboratory or any other organization.

With respect to the broad subject matter of this hearing, I'd like to thank Congress for maintaining a high level of steadfast support over more than a decade. It's this stability that was at the heart of SunShot's success in reaching our 6-cent-a-kilowatt-hour goal 3 years ahead of schedule.

As a natural effect of government's annual budget cycles, challenges sometimes arise when widely varying projections of forward-looking budgets are in play and plans for staffing and for execution of the annual FOA cycle are impacted by these uncertainties.

The FY 2018 planning process was daunting because the final budget was not in place until halfway through the year. Compounding this challenge is the added complexity which is the result of rapid progress in renewable energy cost reduction. In SETO's case, we had numerous points of collaboration with other offices in DOE, which have included the Offices of Electricity, Nuclear, and Fossil Energy. It's these collaborations that help assure that we don't duplicate funding for the same work.

In FY 2018 the Solar Office consolidated what had been subprogram specific FOAs into one mega-FOA comprised of four topic areas to save time and merge multiple parallel processes into one. I will summarize one eccentric event, the decision by acting EE1 Tripodi to cancel Topic 1 of that FOA just a few days before selections were slated to be approved in late August of 2018. Topic 1 addressed the congressional line item activity identified as systems integration. Leadership provided alternate language for reissuing this Topic 1.

The rationale given for cancelation was that the FOA language was not understandable and that appropriate collaboration with the Office of Electricity had not taken place. I will challenge these two assertions.

First, understandability. There were over 90 full proposals submitted for the original Topic 1. These were generated by organizations with technical expertise in the subject area, and in fact leadership's alternate language had to be rewritten. The ultimate reissuance of Topic 1 had all the essential attributes of the original and was expanded to include validation.

Secondly related to collaboration, there is a documented record of email exchanges between the Solar Office and Office of Electricity demonstrating collaboration. My written testimony includes a chronology of collaboration that I initiated in October 2017 and which continued with numerous members of the Office of Electricity all the way through the Federal consensus panel evaluations. There are nearly a half-dozen email threads in my written testimony referencing not just collaboration but editing of our Topic 1 to respond to requests from the Office of Electricity. Reviews and concurrence by Office of Electricity management included the Deputy Assistant Secretary for Advanced Grid Research and Development and the Chief of Staff to the Assistant Secretary.

This unfortunate situation not only slowed progress in expanding resilient, reliable, lower-cost solar power but made it more difficult to engage partners because we pulled the plug on our own operational process.

Allow me to thank you again for the opportunity to provide this testimony, and I'd be pleased to answer any questions.

[The prepared statement of Dr. Gay follows:]

Written Testimony before the
U.S. House of Representatives, Committee on Science, Space, and Technology
Subcommittee on Investigations and Oversight and Subcommittee on Energy

Hearing Entitled "Management and Spending Challenges within the Department of Energy's Office of Energy Efficiency and Renewable Energy"

Charles F. Gay, Ph.D.
Member: Sandia National Laboratory Energy and Homeland Security External Advisory Board
Former: Director of the Solar Energy Technologies Office, Department of Energy's Office of Energy Efficiency and Renewable Energy
February 5, 2020

Chairwoman Johnson, Ranking Member Lucas and distinguished Members of the Subcommittees, it is an honor to appear before you today at this important hearing to better understand general management and spending challenges within the Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE). The Solar Energy Technologies Office (SETO) is one of multiple offices within EERE.

By way of background, I have worked in the field of solar and renewable energy for more than 45 years in both government and private sector roles. I currently serve on Sandia National Laboratory's External Advisory Board for Energy and Homeland Security; as a subject matter expert providing advisory consulting to Energetics' government and private-sector clients; as a founding member of San Jose State University's Engineering Advisory Board; as a new member of the Advisory Panel for the Australian Renewable Energy Agency (ARENA) and as founder of Greenstar. During the George W. Bush Administration, the Greenstar Foundation was selected by the Departments of Commerce, Interior, Energy and State to be the only Non-Government Organization to exhibit in the U.S. Pavilion at the World Summit on Sustainable Development in 2002. I am described on the DOE website as having "led a team that is dedicated to early-stage research and development of solar technologies, with a focus on how they contribute to supporting the reliability, resilience, and security of the U.S. electric grid."

I served as SETO Director (designated EE4S) from August 2016 to November 2019. During these three years, we achieved our SETO SunShot goal of 6¢/kWh three years ahead of schedule. We launched and awarded more than $700 million in funding for solar R&D. We proactively addressed, resolved and cleared a large backlog of legacy contracting issues, while significantly reducing unobligated balances. We created and launched the American-Made Challenges, Solar Prize, to revitalize U.S. manufacturing and streamline the timeline necessary for making awards.

The views expressed in this testimony are my own. I have not collaborated with the DOE in preparation for today's Hearing. I have received no compensation nor reimbursement for my time, travel and miscellaneous expenses. At present, my interaction with DOE includes long-standing friendships with many of the staff at DOE headquarters, SETO's contracting partners in the Golden Field Office (GFO) and with numerous friends across the U.S. National Laboratory system. Ongoing written correspondence with DOE includes topics related to my DOE Thrift Savings Plan and Retirement Contributions. As is policy, I did not retain materials, records or other DOE property upon my voluntary retirement. I did retain a copy of my signed certification record associated with a Freedom of Information Act (FOIA) document production designated by DOE as HQ-2018-01594-F. In preparing this testimony I have had access to some portion of on-line redacted materials produced and submitted by DOE.[1,2A] As best I recall, my original document production pursuant to the FOIA request numbered about 50 with some parsed into multiple segments. Many of these subsections were given separate document numbers by the DOE FOIA Office. From my original production, 52 numbered documents were returned for certification. Approximately 5 of my originally submitted documents had been deleted and one new document, I didn't recall as being from my personal materials, was added. The redacted document count available on-line is 32. The on-line folder from reference 1, labeled, "Production 1-HQ-2018-01594-F First Partial Responsive Documents" (all submitted by me), is absent at least two documents relevant to this Hearing.

The solar community is appreciative of these Subcommittees' historical and continued attention. We are especially thankful for the continued financial resources that support the ongoing success of cost competitive solar power. The U.S. solar industry now counts over 250,000 high-paying jobs.[2] And we are thankful that the Committee has shown, by way of this Hearing and other similar Hearings over time, of the engagement with EERE's business practices with an eye toward continuous improvement.

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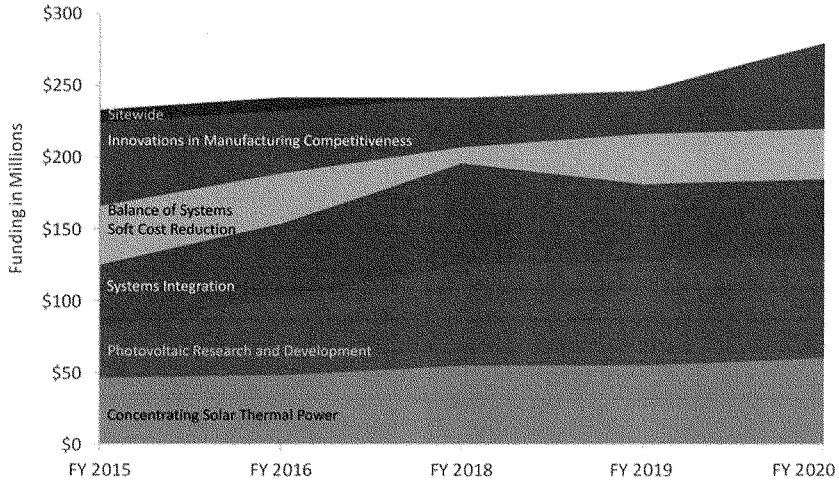
[1] https://drive.google.com/drive/folders/1qYMxvktXh0EVP-N_V7gNgkUvva8jCn-h
also ref. 2A https://www.eenews.net/assets/2019/08/07/document_ew_02.pdf
[2] https://www.thesolarfoundation.org/solarjobscensusarchives/

I. Comments on SETO Spending

Rapid progress in meeting the SunShot goals set in 2011 were the result of steadfast congressional support over many years. This stability, along with the commitment of dedicated staff at DOE and at least 13 of the DOE National Laboratories has been consequential as previously noted.[3]



SETO Budget History

While the budget reflects excellent long-term stability, the process of reaching the final approved budget has at times been protracted and unpredictable. This was especially the case in FY2018, when a final budget was signed on March 23rd 2018. As of November 1, 2017 (second month of FY2018) the span of potential outcomes for SETO's budget was wide-ranging. This affected planning for staffing levels and scope definition for FY2018 FOAs.

Project Activity	FY2016 Enacted, $	FY2017 Enacted, $	FY2018 Admin. Req.$	FY2018 House Req. $	FY2018 Senate Req. $
Total	241,600,000	207,600,000	69,700,000	90,000,000	167,500,000
Concentrating Solar Power	48,400,000	55,000,000	8,000,000	18,233,557	48,000,000
Photovoltaics	53,152,000	64,000,000	43,700,000	43,700,000	48,000,000
Systems Integration	52,447,000	57,000,000	18,000,000	18,000,000	45,500,000
Balance of System (soft costs)	34,913,000	15,000,000	-	3,988,590.60	10,500,000
Technology to Market	43,488,000	16,600,000	-	6,077,852.35	16,000,000
NREL / Sitewide	9,200,000				

3 https://www.energy.gov/sites/prod/files/2020/01/f70/SETO%20Quarterly%20Stakeholder%20Webinar%20January%202020_0.pdf

The final SETO budget for FY2018 shows that, rather than shrinking, funds increased over FY2017 and matched the FY2016 funding level.

Sub-Programs	FY 2017 Enacted, $k	FY 2018 Enacted, $k
Total	**207,600**	**241,600**
Concentrating Solar Power	55,000	55,000
Photovoltaic Research and Development	64,000	70,000
Systems Integration	57,000	71,200
Balance of Systems Soft Cost Reduction	15,000	11,000
Innovations in Manufacturing Competitiveness	16,600	34,400

For the EERE organization, the administration's budget request for FY2018 was far below the prior year.

Administration proposal for EERE in FY2017[4] $2,900 Million
Administration proposal for EERE in FY2018[5] $636 Million

In 2017 the EERE organization was staffed at approximately 625 employees, as I recall. With a potential funding decline, planning was necessary that included consideration of a reduction to, perhaps, a low of 450 employees.

The next pages (5-18) provide a chronology of certain events associated with Topic 1 of SETO's FY2018 FOA. As noted, the details have been largely extracted from Reference 1 and complemented by memory, when written records were not available.

[4] https://www.energy.gov/fy-2017-department-energy-budget-request-fact-sheet
[5] https://www.energy.gov/sites/prod/files/2017/05/f34/DOEFY2018BudgetFactSheet.pdf

II. The FY2018 SETO FOA Topic 1 timeline, related to solar integration with the electric grid.

#	Date	Activity	Added Detail	Personal Comments
1	January 2017	EE4 Dr. Tim Unruh succeeds Roland Risser as DAS Renewable Power[6]		
2	November 2017	EE4S Gay briefs B. Parks (OE) on FY2018 FOA plan and timeline ref 1 #7, pg 69		One of my goals was to build collaborative bridges with the Office of Electricity. Special recognition to Michael Pesin Gil Bindewald is of note.
3	November 20, 2017	Acting EE1 Simmons approves FOA Requirements Doc. ref1 #7, pg 69		
4	November – December 2017	SETO staff brief OE including DAS Jereza (OE20) on multiple FOA topics incl. Topic 1 ref1 #7, pg 69	Subtopic 1.1 identified for further development (Adaptive Local Grids)	
5	December 2017 – March 2018	SETO staff collaborates with G. Bindewald (OE) on Topic 1 including subtopics 1.1-1.3 ref1 #7, pg 69	Shared results with OE20 Jereza and DAS Pesin (OE10)	
6	January 2018	DOE Management Administration (MA) approves FOA Requirements Document ref1 #7, pg 69		
7	14 February 2018	The Office of Cybersecurity, Energy Security, and Emergency Response, CESER, is created.[7]		
8	1 March 2018	G. Yuan (SETO) sends FOA Topic 1 to G. Bindewald and incorporates the feedback into an updated wording. ref1 #6, pg 387		

[6] https://www.linkedin.com/in/timothy-unruh-895a135/
[7] https://www.greentechmedia.com/articles/read/doe-new-office-energy-infrastructure-security-cybersecurity

#	Date	Activity	Added Detail	Personal Comments
9	22 March 2018	G. Bindewald confirms that the revised Topic 1 wording incorporates his recommendation. OE10 Pesin is copied. ref1 #6, pg 389		
10	April 2018	EE1 COS Fitzsimmons approves FOA Requirements Doc. ref1 #7, pg 69		
11	16 April 2018	FOA Released	S1 press release[8] includes Topic 1 for PV+grid, Sept notification	
12	17 April 2018	SETO FOA published[9]		
13	25 April 2018	SETO FOA Webinar[10]		
14	5 May 2018	SETO FOA updated [11]		
15	9 May 2018	Concept Paper Deadline		
16	5 June 2018	Encourage/Discourage decisions released		
17	29 June 2018	SETO FOA Q&A Updated[12]		
18	5 July 2018	Full applications due	90+ applications for ~$250 million. FOA stated $46 million for ~ 14 projects	
19	5 July 2018	C. Tripodi appointed acting EE1[13]		

[8] https://www.energy.gov/articles/us-secretary-energy-rick-perry-announces-105-million-new-funding-advance-solar-technologies
[9] https://eere-exchange.energy.gov/FileContent.aspx?FileID=09e8a87d-3019-49bd-99a7-4bdea3bbc8ce
[10] SETO FY18 FOA Applicant Webinar_Topic 1
[11] https://eere-exchange.energy.gov/FileContent.aspx?FileID=09e8a87d-3019-49bd-99a7-4bdea3bbc8ce
[12] https://eere-exchange.energy.gov/FileContent.aspx?FileID=b8b7c027-02f4-4d55-bc77-efac5aa5923a
[13] https://www.eenews.net/greenwire/stories/1060087939?t=https%3A%2F%2Fwww.eenews.net%2Fstories%2F1060087939

#	Date	Activity	Added Detail	Personal Comments
20	12 July 2018	Acting EE1 Tripodi communicates there will be a new FOA briefing process. [ref1 #6, pg 515]		
21	23 July 2018	EE4 Unruh first meets with acting EE1 Tripodi. She asks that OE20 Jereza know that OE has helped draft the SETO FOA language. [ref1 #7, pg 47]		
22	25 July 2018 8:39 a.m.	EE4 Unruh reports that acting EE1 Tripodi asks for thoughts on SETO Topic 1 from OE20 Jereza [ref1 #5, pg 1]	esp. regarding coordination with OE	
23	25 July 2018 8:28 p.m.	G. Bindewald (OE) informs OE20 Jereza that OE has active biweekly engagement reviews with SETO on Topic 1. D.Ton (OE) is also actively involved with SETO on Puerto Rico. [ref1 #5, pg 41] which brings the organizations together even more frequently than normal.		
24	30 July 2018 morning	EE4 Unruh meets with acting EE1 Tripodi, also attending is OE20 Jereza. OE20 Jereza indicated she was not clear on what coordination had occurred between OE and SETO. Acting EE1 Tripodi and OE20 Jereza expressed that they thought some Topic 1 language was unclear. [ref1 #7, pg 47]		

#	Date	Activity	Added Detail	Personal Comments
25	30 July 2018 1:44 p.m.	Acting EE1 Tripodi emails OE1 Walker (OE1), A. Lotto (COS OE1) and OE20 Jereza that SETO has offered to rewrite Topic 1. ref1 #5, pg 43	Acting EE1 Tripodi also reports that she and OE20 Jereza do not understand the FOA and ask that it be rewritten to be consistent with the OE mission.	This is the apparent genesis of the Topic 1 breakdown. Nobody from EERE was apparently copied on this email and no evidence that such an offer was made has been found in the collection of documents produced and posted under the FOIA.
26	30 July 2018 early afternoon	EE6 Bindu Jacob (EERE Office of Operations) reports that acting EE1 Tripodi had asked questions about changing FOAs which are already on the street. ref1 #7, pg 47		
27	30 July 2018 late afternoon	EE4 Unruh stops by acting EE1 Tripodi's office to report that FOAs could be changed and EE6 Jacob was working with the GFO to develop the mechanics. Acting EE1 Tripodi also asked for and received a copy of the SETO Topic 1 plus the FOA preamble to be shared with OE1 Walker to see if he thought any changes were necessary. ref1 #7, pg 48		
28	May – August 2018	D. Ton (OE)	Participates in Topic 1 reviews	

#	Date	Activity	Added Detail	Personal Comments
29	2 August 2018	EE4 Unruh emailed OE20 Jereza asking if there was any information on the SETO Topic 1 (among other things). ref1 #7, pg 48	At this time the Topic 1 FOA was being Merit Reviewed. Accordingly, as sense of urgency was needed. OE20 Jereza replies that there was no further information on the Topic 1 FOA.	
30	6 August 2018	Acting EE1 Tripodi informs EE4 Unruh and OE20 Jereza that she spoke to OE1Walker and he was hopeful of having something by 8 August 2018. OE1 Walker wants solar to be located closer to the grid to serve a national security priority mission. ref1 #7, pg 52	Acting EE1 Tripodi states that it would be appropriate to wait for OE1 Walker's language because she is unable to explain it like he can.	The original Topic 1 FOA (1840) solicited proposals for Adaptive Local Grids, Advanced Systems Integration Technologies.
31	8 August 2018	Applicants reply to reviewer comments		
32	9-17 August 2018	In-person merit reviews	OE staff including Gil Bindewald, S. Walls, C. Irwin participate and make recommendations for Selection Official EE4S Gay	
33	15 August 2018	SETO Deputy Director Dr. Jones-Albertus meets with OE1 COS A. Lotto and reviews Topic 1.1 – 1.3 and copies documentation of collaboration with G. Bindewald (OE) and others in the Office of Electricity. ref1 #6, pg 408		

#	Date	Activity	Added Detail	Personal Comments
34	21 August 2018	K. Fricker (SETO FOA manager) reports 1142 concept papers were submitted for the total FOA. 508 full and eligible applications were ultimately submitted. ref1 #6, pg 503		
35	21 August 2018	EE4 Unruh provides data to acting EE1 Tripodi on Topic 1 applications, concept papers in response to 17 August request. ref1 #7, pg 42		
36	21 August 2018 6:35 a.m.	EE4 Unruh emails acting EE1 Tripodi asking if there is an update on the language in the SETO FOA. ref1 #7, pg 59	He also states that the Federal Consensus Panel for Topic 1 was meeting this week, so any information would be helpful	
37	21 August 2018 7:13 a.m.	EE4 Unruh responded to acting EE1 Tripodi's request for Topic 1 statistics which included the number of applications received and additional statistics. ref1 #7, pg 60		These statistics were incorporated by all EERE Offices as part of FOA reviews with acting EE1 Tripodi and included: The number of concept papers, number of invitations for full proposals, number of proposals evaluated, number selected and cost share. Also reported were the number of selectees new to the Office portfolio, number of selectees that do not currently have a financial assistance award with the Office. Geographic location of selectees and their partners along with the categorization of stakeholder attributes such as industry, small business, academia became mandatory after the next reported meeting.

#	Date	Activity	Added Detail	Personal Comments
38	23 August 2018	DAS4 Unruh documents chronology of SETO Topic 1 interactions with acting EE1 Tripodi. ref1 #6, pg 532		
39	27 August 2018	EE4S Gay briefs acting EE1 Tripodi, EE4 Unruh and EE1 COS Fitzsimmons on the Solar Prize and role of Power Connectors		The scheduled 5 minute review became a 25 minute discussion of the geographic locations of the business incubator hosts with challenge questions centering around why the Midwest and southeast didn't have more representation. Acting EE1 Tripodi asserted that EE4S Gay didn't know where manufacturing takes place in America. In response, EE4S Gay showed the map SETO created of the location of start-ups funded by the Office over seven years that had been successful in raising subsequent rounds of capital from the private sector. Acting EE1 Tripodi asserted that EE4S Gay "didn't know what [he] was talking about." She indicated that "we need to fund more work in these geographic areas."

#	Date	Activity	Added Detail	Personal Comments
39	27 August 2018 (continued)	EE4S Gay briefs acting EE1 Tripodi, EE4 Unruh and EE1 COS Fitzsimmons on the Solar Prize and role of Power Connectors		Acting EE1 Tripodi also required that SETO provide the names of those submitting full proposals but were not selected and the names of the original 41 groups expressing interest. Acting EE1 Tripodi again reaffirmed that the Midwest and southeast are where America manufactures. EE4S Gay pointed out where he had personally built solar manufacturing plants in California and Washington state. California and Washington had people with the necessary background skills, largely from the aerospace sector. Washington state was ideal for energy-intense single crystal silicon manufacturing. In addition, the proximity of supply chain resources, including polysilicon from Moses Lake, and argon and high purity crucibles made just-in-time production more cost effective. Power supplied by Bonneville Power Authority was dual redundant, which increased overall yield.
40	27 August 2018 2:59 p.m.	GFO1 Passarelli sends new Topic 1 language to D. Bobo	New language matches document handed to EE4S Gay the next day. ref1 #6, pg 541	

#	Date	Activity	Added Detail	Personal Comments
41	27 August 2018 4:28 p.m.	Diana Bobo (GFO) informs Kyle Fricker (SETO FOA manager), Guohui Yuan (SETO Program Manager for system integration) and Clay Pfrangle (GFO) that acting EE1 is seeking to revise Topic 1 and re-post. ref1 #7, pg 61		
42	28 August 2018 1:30 p.m.	EE4S Gay meets with acting EE1 Tripodi and EE1 COS Fitzsimmons		See detailed recollection below. Bottom line: cancel Topic 1 and re-issue.
43	28 August 2018 5:00 p.m.	EE4S Gay informs SETO Program Managers, EE4 Unruh, EE4 COS Hamos, K. Fricker (SETO FOA Manager), S. Murley (SETO Communications) of Topic 1 cancellation		
44	28 August 2018 7:30 p.m.	D. Passarelli (Director GFO) informs acting EE1 Tripodi, EE1 COS Fitzsimmons and EE4S Gay of cancellation of Topic 1 with plans for preparing and issuing a replacement FOA with goal of 45 days and plans for messaging the 90+ applicants to Topic Area 1.		
45	29 August 2018 6:41 a.m.	DAS4 Unruh sends email to EE1 COS Fitzsimmons with an idea that could be "a win all around on this." ref1 #6, pg 545	EE1 COS Fitzsimmons responds he's on his way to meet.	

#	Date	Activity	Added Detail	Personal Comments
46	30 August 2018 5:45 a.m.	EE6 Jacob asks GFO1 Passarelli what FOAs are going to require modification. Response is SETO and the Building Technologies Office (BTO) (who was not been informed) ref1 #7, pg 34 Solid State Lighting FOA may also be in play but managed by NETL	Plan for SETO Topic 1 is to simultaneously place notice of cancellation and Notice of Intent (NOI) to issue new Topic 1. EE1 COS Fitzsimmons provided NOI language.	
47	31 August 2018 10:30 a.m.	EE4S Gay convenes all-hands SETO meeting to update employees on current status and process moving forward		Need to maintain integrity of SETO funds appropriated by Congress and integrity of the FOA process (for example EE4S Gay only "acknowledged" the replacement FOA 1987 rather than sign off); need to maintain relationships with key stakeholders. In racing to deliver a new FOA, it was necessary to assure the quality and integrity of work product.
48	31 August 2018 2:37 p.m.	M.L.Renfro (DOE External Coordination) emails House of FOA change[ref1 #7, pg 15-18]		
49	31 August 2018 3:00 p.m.	Topic 1 applicants notified of FOA revision, NOI (DE-FOA-0001986) for new FOA (DE-FOA-0001987) posted[14] ref1 #7, pg 15-18	"EERE plans to Issue the FOA on or about September 15, 2018"	

[14] https://eere-exchange.energy.gov/FileContent.aspx?FileID=553e0d1e-3925-41bb-bd37-6e366e2f1171

#	Date	Activity	Added Detail	Personal Comments
50	31 August 2018 4:36 P.M.	J. Shimek (Clerk, U.S. House Appropriations Committee) responds to M.L. Renfro and B. Forcier at DOE ref1 #7, pg 15-18	How far along was original FOA	
51	31 August 2018 4:39 p.m.	J. Shimek responds to M.L. Renfro and B. Forcier (DOE Budget Analyst) ref1 #7, pg 15-18	EERE should not do anything publicly or formally with this until we understand what is happening here	
52	31 August 2018 8:12 p.m	J. Shimek instructs J.G. Vonglis (DOE CFO), B.Forcier, C. Johns (DOE Director of Budget). cc: to C. Hanson (Professional Staff Member, U.S. Senate Committee on Appropriations) ref1 #7, pg 15-18	Hill needs full briefing from DOE BEFORE anything is done to cancel, postpone, and/or put a hold on originally selected projects and BEFORE anything is done to put out a new FOA	
53	31 August 2018 10:51 p.m.	B. Forcier reports EE6 Jacob informed upper DOE of plan for announcing new FOA late afternoon of 30 Aug ref1 #7, pg 15-18		
54	7 September 2018	Acting EE1 Tripodi announces departure of EE4 Unruh and replacement with EE3 Chalk to simultaneously serve as acting EE4 beginning 17 September 2018		
55	7 September 2018	Acting EE1 Tripodi announces that Topic 1 was cancelled in July during a review of the remaining SETO FOA selections ref1 #7, pg 47		

#	Date	Activity	Added Detail	Personal Comments
56	18 September 2018 1:45 p.m.	Acting EE1 Tripodi emails S3 Menezes, S. Varnasidis (COS S3) and A. Webster (Senior Advisor S3) that she and OE20 Jereza met with EERE staff 3 times asking what Topic 1 meant. Staff was unable to explain and, after indicating they would amend the FOA, which did not happen. Instead, the Merit review proceeded through final scoring against direction. [ref1 #7, pg 157]	Acting EE1 Tripodi further asserts that she, OE20 Jereza and acting EE4 Chalk worked on the rewrite to ensure taxpayers are provided a Topic 1 that makes sense and is competitive for all applicants. [ref2 #7, pg 157]	Technical staff from the OE, EERE, GMI and SETO offices tried on multiple occasions to explain the FOA. Gil Bindewald (OE) had emailed the collaborative background on July 25. The 90+ applicants understood what they were proposing and any clarifying questions received replies on the EERE Exchange server for full transparency to all.
57	18 September 2018 7:04 p.m.	Acting EE4 Chalk forwards rewritten version of acting EE1 write-up for a new FOA seeking feedback from EE1 COS Fitzsimmons, acting EE1 Tripoti, and OE20 Jereza		

#	Date	Activity	Added Detail	Personal Comments
58	2 October 2018	Storyline preparation for meeting with HEWD [ref1 #7, pg 385-386]	DOE leadership asked for a review of all EERE FOAs During the review of the solar FOA, the decision was made that Topic 1 needed to be updated to more clearly and concisely communicate DOE's objectives of energy security and resiliency The solar FOA was not at the point in the process that acting EE1 would have been briefed on the FOA applicants, so she was not aware of any of the applicants when she made the request to update Topic 1	The Solar FOA was not formally reviewed until months later. When SETO initially presented the FY2018 selections, mention was made of FOA Topic 1 in the report. Acting EE1 Tripodi immediately instructed EE4S Gay and acting EE4 Chalk to leave the room and not return for the SETO FOA briefing, until anything related to Topic 1 had been excised.
59	3 October 2018	S3 Menzes, acting EE1 Tripodi et.al. appear at HEWD		
60	12 October 2018	New FOA published. DE-FOA-0001987[15]		
61	7 November 2018	FOA 1987 Webinar[16] and Script[17]		

[15] DE-FOA-0001987 Advanced Systems Integration for Solar Technologies
[16] SETO SI ASSIST FOA Webinar
[17] ASSIST FOA Applicant Webinar Script

#	Date	Activity	Added Detail	Personal Comments
62	14 November 2018	Letter of Intent due for Replacement Topic 1 FOA 1987		
63	30 November 2018	Updated Q&A FOA 1987[18]		
64	7 December 2018	Submission Deadline for Full Applications FOA 1987		
65	8 December 2018	EERE Upper Management and Communications staff were required to take a 2 day "Plain Writing" course. Attendance was taken for each day and reported.	Michael Coogan was designated as the DOE Plain Writing Contact	
66	1 February 2019	Expected Submission Deadline for Replies to Reviewer Comments		
67	6 February 2019[19]	D. Simmons sworn in as EE1		
68	22 March 2019	Expected Date for Selection Notifications FOA 1987		

[18] DE-FOA-0001987 QandA updated 11/30/18
[19] https://www.energy.gov/articles/daniel-simmons-ceremonially-sworn-doe-assistant-secretary-energy-efficiency-and-renewable

Re page 12: Tuesday 28 August 2018 at 1:30 p.m. acting EE1 Tripodi, EE1 COS Fitzsimmons, EE4S Gay .....based on personal recollection.

On the morning of 28 August, EE4S Gay was asked by calendar invitation to attend a meeting with acting EE1 Tripodi and EE1 COS Fitzsimmons. This was surprising in light of acting EE1 Tripodi's insistence that only DAS-level staff represent the voice of subordinates. EE4S Gay's DAS, EE4 Unruh, was in the office that day, just several doors away from acting EE1 Tripodi's office, but was not invited to join.

Acting EE1 Tripodi handed EE4S Gay a print-out of a "new version" of the Topic 1 FOA. Acting EE1 Tripodi said: "we agreed" a rewrite was needed. The rewrite had 3 sub-sections. EE4S Gay was informed that it was to be used in place of the existing Topic 1 and that it had all the key elements of the existing Topic 1 FOA.

Here is how the conversation went:

EE4S Gay:

I said such a last-minute change would be highly disruptive, unnecessary and costly. I asked for the rationale. Why do "we" think it's necessary to reissue?

acting EE1 Tripodi:

The wording used in the current version is not understandable. It reads like old style solar from 2015 and 2016. Further, there are too many buzzwords.

EE4S Gay:

We had over 350 concept papers and more than 90 full applications, which would likely lead an objective person to see that the communities of professionals actively participating in the industry had no such difficulty. Furthermore, any ambiguities could be addressed through the EERE exchange and clarifications would be visible to the public.[20] I was provided little time to read the new document but identified the narrowly defined addition of direct coupling of PV to motor frequency control of agricultural fans (presumably in greenhouses) to stand out, simply because such configurations were already commercial.

acting EE1 Tripodi:

Replied that frequency control is useful.

EE4S Gay:

I'm not arguing the generality but the specific application to fans should be opened to encompass high value attributes associated with grid frequency control, resilience and reliability

acting EE1Tripodi

Did you even read the FOA yourself?

EE4S Gay:

Of course I did. I worked to develop it and I understand it or I wouldn't have put it forward in the first place. You (meaning acting EE1 Tripodi) never asked me to explain it.

[20] https://eere-exchange.energy.gov/FileContent.aspx?FileID=b8b7c027-02f4-4d55-be77-efae5aa5923a

acting EE1 Tripodi

Do you really think issuing a new FOA will be an issue?

EE4S Gay:

Absolutely yes. The stakeholder community has invested time and effort at their own expense to prepare proposals. Taxpayer money has been used to fund the process of issuing and reviewing the FOA. Qualified Merit Reviewers were retained. Such specialized expertise is difficult to find. With the cancellation, SETO was at risk of having these experts become "unavailable" for future reviews. Among other things....

acting EE1 Tripodi

All elements of the original Topic 1 are encompassed by the new write-up.

EE4S Gay

I don't see any reference to Topic 1.3 solar+X, such as PV plus batteries or PV plus pumped hydro. As far as I have had the chance to read these two pages, subtopic 3 is not present.

acting EE1 Tripodi:

It's in there.

EE4S Gay

Could you point it out to me?

Acting EE1 Tripodi:

You'll find it.

EE4S Gay:

I need time to collect my thoughts, since this is such a shock and puzzlement. I will sync up with GFO1 Passarelli and EE1 COS Fitzsimmons and find a plausible rationale that can be used to explain why it is necessary to reissue the FOA. At this instant, I'm thinking that we could update the context in light of DOE establishing the CESER Office.

On the way out of acting EE1 Tripodi's office, EE1 COS Fitzsimmons followed EE4S Gay down the hallway and profusely apologized for the situation. EE4S Gay said that he didn't like being blindsided, especially at this point where we have made selections for all FOA topics.

Estimated cost to change the original FOA
What was the cost of applying to and administering Topic 1 of the FOA?

- Compensate reviewers for Topic 1 Merit Reviews ($3k/reviewer): ~$80k
- DOE staff time to administer Topic 1: ~$500k Topic specific work – estimated by using burdened person-hours
    1. Topic ideas meeting
    2. Workshops
    3. Topic refinement
    4. FRD topic 1 language drafting, review and approval
    5. FOA topic 1 summary language drafting, review and approval
    6. FOA topic 1 detailed language for full FOA drafting, review and approval
    7. Reviewer recruitment
    8. Concept paper review and preparation
    9. Full application review and preparation
    10. Merit review and coordination
    11. Selection decision and briefing preparation
    12. Merit review advisory report preparation and approval
    13. Federal Consensus review and coordination (OE, GMI, SETO)
    14. Documentation and analysis for final report
- Estimated funds and opportunity cost incurred by applicants to the FOA: indeterminate, incurred by each applicant

III. Appendices

A. FOA Versions

i. Original 1840 – 4 topics.

Topic 1: Adaptive Local Grids, Advanced Systems Integration Technologies (20% cost share, TRL 2-5)
Topic 1.1 – Adaptive Local Grids
Topic 1.2 – Solar Observability
Topic 1.3 – Solar + X
Topic 1.4 – Innovative Pathways: Systems Integration

ii. C. Tripodi rewrite – 3 topics – see appendix

Topic 1.1 – Solar Grid Integration
Topic 1.2 – Solar Situational Awareness and Analysis
Topic 1.3 – Solar Technology Transfer

Challenges associated with the rewrite included:
The first subtopic speaks to solutions to be developed by the FOA appropriate for integration "throughout the bulk power systems or associated transmission to distribution substations." The remainder of the narrative speaks to Distributed Energy Resource (DER) solutions. Since DERs cannot be deployed to transmission lines, there will be confusion.

Blending transmission with distribution is not how utilities operate. Reference to "voltage testing" is not meaningful, unless context is provided.

The second paragraph for three sub-topics indicates that projects should include deployment aspects by stating proposals should explore taking "proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure." This needs to be discussed with the Contracting Officer in Golden, CO because higher TRL levels require higher cost share as responders will potentially include demonstration projects.

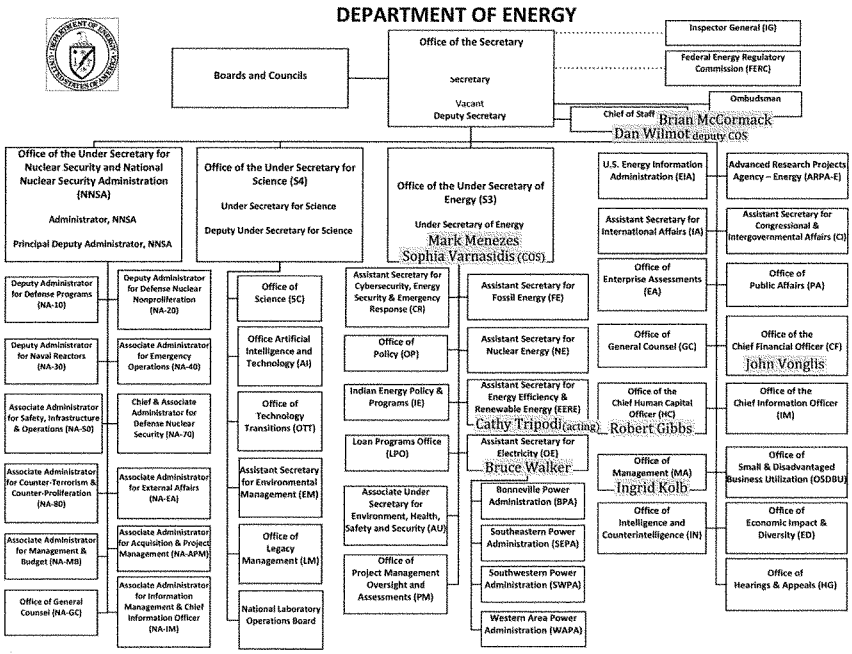
Since the new language emphasizes security and resiliency, we will want to add CESER to the review process, along with OE.

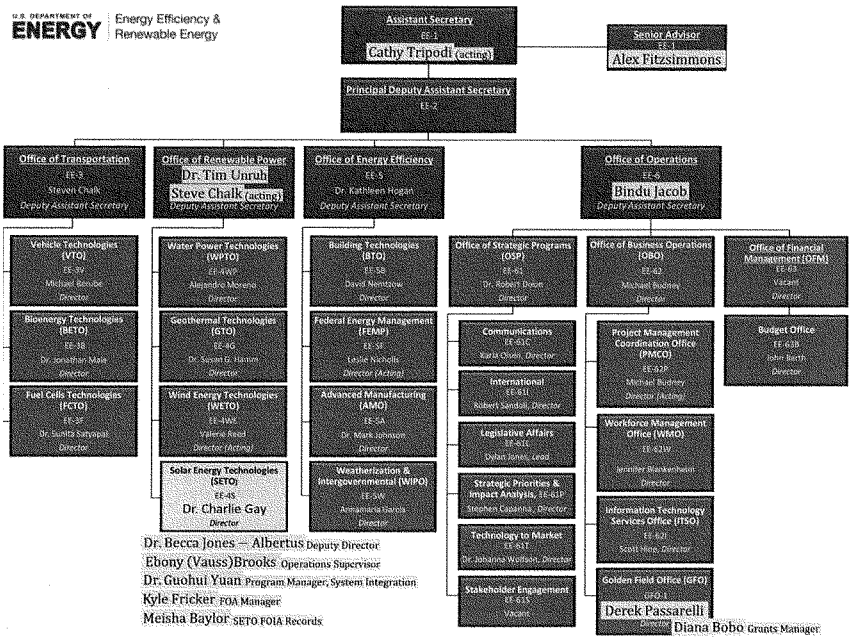
Solar+X (such as solar with storage), the original sub-topic 3 was deleted.

iii. Final revision 1987 – 2 topics

Topic 1.1 R&D and Technology Transfer for solar situational awareness in strategic locations associated with critical infrastructure
Topic 1.2 R&D, Technology Transfer and Validation of proactive resilience solutions for critical infrastructure.

B. **DOE Organization Charts** :Highlighting Some Key Principals




U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy
Assistant Secretary
EE-1
Cathy Tripodi (acting)
Senior Advisor
EE-1
Alex Fitzsimmons
Principal Deputy Assistant Secretary
EE-2
Office of Transportation
EE-3
Steven Chalk
Deputy Assistant Secretary
Office of Renewable Power
Dr. Tim Unruh
Steve Chalk (acting)
Deputy Assistant Secretary
Office of Energy Efficiency
EE-5
Dr. Kathleen Hogan
Deputy Assistant Secretary
Office of Operations
EE-6
Bindu Jacob
Deputy Assistant Secretary
Vehicle Technologies (VTO)
EE-3V
Michael Reuter
Director
Bioenergy Technologies (BETO)
EE-3B
Dr. Jonathan Male
Director
Fuel Cells Technologies (FCTO)
EE-3F
Dr. Sunita Satyapal
Director
Water Power Technologies (WPTO)
EE-4WP
Alejandro Moreno
Director
Geothermal Technologies (GTO)
EE-4G
Dr. Susan G. Hastim
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Wind Energy Technologies (WETO)
EE-4WS
Valerie Reed
Director (Acting)
Solar Energy Technologies (SETO)
EE-4S
Dr. Charlie Gay
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Building Technologies (BTO)
EE-5B
David Nemtzow
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Michael Budney
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EE-6D
Vacant
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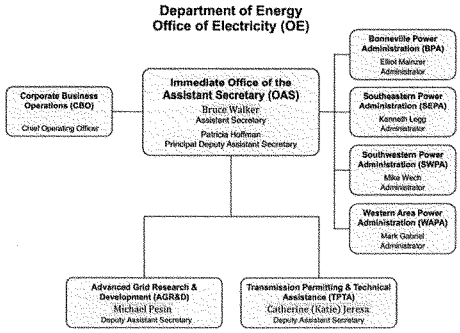
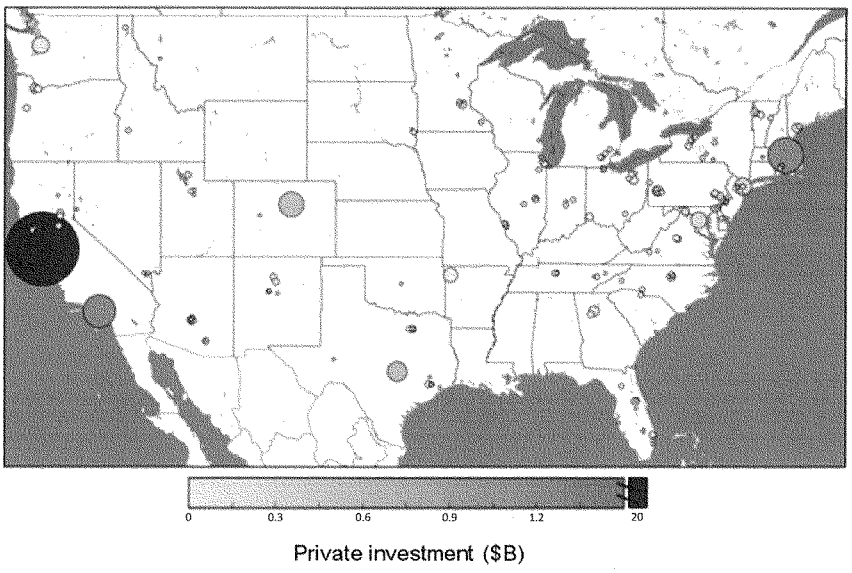
Communications
EE-6JC
Karla Olsen, Director
International
EE-6IL
Robert Sandoli, Director
Legislative Affairs
EE-6JL
Dylan Jones, Lead
Strategic Priorities & Impact Analysis, EE-6JP
Stephen Capanna, Director
Technology to Market
EE-6JT
Dr. Johanna Wolfson, Director
Stakeholder Engagement
EE-6JS
Vacant
Project Management Coordination Office (PMCO)
EE-6JR
Michael Budney
Director (Acting)
Workforce Management Office (WMO)
EE-6JW
Jennifer Blankenship
Director
Information Technology Services Office (ITSO)
EE-6JI
Scott Hine, Director
Golden Field Office (GFO)
GFO-1
Derek Passarelli
Director
Diana Bobo Grants Manager
Budget Office
EE-6JB
John Barth
Director
Dr. Becca Jones – Albertus Deputy Director
Ebony (Vauss)Brooks Operations Supervisor
Dr. Guohui Yuan Program Manager, System Integration
Kyle Fricker FOA Manager
Meisha Baylor SETO FOIA Records


Department of Energy
Office of Electricity (OE)
Corporate Business Operations (CBO)
Chief Operating Officer
Immediate Office of the Assistant Secretary (OAS)
Bruce Walker
Assistant Secretary
Patricia Hoffman
Principal Deputy Assistant Secretary
Bonneville Power Administration (BPA)
Elliot Mainzer
Administrator
Southeastern Power Administration (SEPA)
Kenneth Legg
Administrator
Southwestern Power Administration (SWPA)
Mike Wech
Administrator
Western Area Power Administration (WAPA)
Mark Gabriel
Administrator
Advanced Grid Research & Development (AGR&D)
Michael Pesin
Deputy Assistant Secretary
Transmission Permitting & Technical Assistance (TPTA)
Catherine (Katie) Jerkins
Deputy Assistant Secretary

C. Map reflecting SETO funding successes as measured by independent capital raises based on DOE awards.[21]



Geographic distribution of the number of active solar companies (represented by the size of the circle) and amount of private equity investments (represented by the fill color of the circle). Data are collected from Pitchbook and include transactions between 2000 and 2017.

[21] Source: Jonathan P. Trinastic, Senior Data Scientist, Duke Energy

IV: Conclusion

Renewable energy is key for the transition to a less carbon-intensive, sustainable world. Stanford's Mark Z. Jacobson is scheduled to soon publish a comprehensive plan for reaching 100% renewable energy by 2050.[22] Such a detailed roadmap is long overdue. Having metrics and practical examples to inspire and track progress was paramount to SETO's success in driving down solar power system costs. The consistent, stable, long term support congress provided to our office produced results and created a deep talent pool for the future. The SunShot success demonstrates the principle.

Thank you for the opportunity to appear before the Committee today. I look forward to your questions.

Attachments

1. Original Topic 1 FOA (1840) - Abbreviated
2. Intermediate FOA Replacement Supplied by Acting EE1 Tripodi
3. Final "Topic 1" Replacement FOA (1987) - Abbreviated
4. FOA Development Standard Operating Procedure (Glossary - page 6)
5. EE4S Gay FOIA Certification

[22] https://web.stanford.edu/group/efmh/jacobson/WWSBook/100PctWWSIntroTOC.pdf

Attachment 1

Original Topic 1 FOA (1840) - Abbreviated

Complete FOA in Reference 9::
https://eere-exchange.energy.gov/FileContent.aspx?FileID=09e8a87d-3019-49bd-99a7-4bdea3bbc8ce

I. Funding Opportunity Description

A. Description/Background

This Funding Opportunity Announcement (FOA) is being issued by the U.S. Department of Energy's (DOE), Office of Energy Efficiency and Renewable Energy (EERE), Solar Energy Technologies Office (SETO). This section describes the overall goals of SETO and the type of projects that are being solicited for funding support through this FOA.

In 2016, solar power surpassed 1% of annual electricity supply in the United States for the first time, and the Energy Information Administration projects that solar will grow to 5% of U.S. electricity by 2030.[1] Further, if the price of solar electricity and/or energy storage declines more rapidly than projected, that percentage could be even higher.[2] But solar is more than just a source of affordable electricity; it also provides the potential to improve grid reliability and resilience, increase employment ,[3] create business opportunities, increase energy diversity, and provide environmental benefits.

The mission of the Solar Energy Technologies Office (SETO) is to support early-stage research and development to improve the performance and flexibility of solar technologies that contribute to a reliable and resilient U.S. electric grid. The office invests in innovative research efforts that securely integrate more solar energy into the grid, enhance the use, storage and dispatch of solar energy, and lower solar electricity costs.

SETO focuses on two different solar energy technologies: photovoltaic (PV) technologies that directly convert sunlight into electricity, typically via a semiconductor, and concentrating solar thermal power (CSP) technologies that convert sunlight to heat, which can be converted or stored until needed, and then used to generate electricity or provide other energy services. Because sunshine varies with the time of day, location, and season, solar power systems must be paired with adaptive loads, other sources of power, or energy storage to deliver electricity whenever it's needed. This dependency reduces the value of solar power systems once solar starts to supply a significant fraction of the electricity within a

[1] U.S. Department of Energy, Energy Information Administration, International Energy Outlook 2017, DOE/EIA-0484 (2017).

[2] P.A. Basore and W.J. Cole, "Comparing supply and demand models for future photovoltaic power generation in the USA," submitted to *Progress in Photovoltaics: Research and Applications*, 2017.

[3] The Solar Foundation, *National Solar Jobs Census*, 2010 – 2016.

given region and highlights the need for a focus on addressing grid integration challenges.

SETO, in partnership with other offices at DOE, launched the SunShot Initiative in February 2011 with the goal of solar electricity becoming price-competitive with conventional utility sources by 2020.[4] The SunShot 2020 goal has already been achieved for utility-scale PV, and with continued effort, it is likely to be achieved for grid-tied solar applications. As a result of this tremendous progress and in response to the growing deployment of solar in the U.S., SETO is increasing its focus on addressing the challenges related to seamlessly integrating high penetrations of solar energy onto the nation's electricity grid. Additionally, SETO set 2030 cost targets to further reduce the cost of solar electricity across all market sectors, which would make solar one of the most affordable sources of electricity and enable a substantial fraction of U.S. electricity demand to be supplied by solar technology.[5] The targets for the unsubsidized cost of electricity at the point of grid connection in a location with average U.S. solar resources are 3¢ per kilowatt-hour (kWh) for utility-scale photovoltaics, 4¢ per kWh for commercial rooftop photovoltaics, 5¢ per kWh for residential rooftop photovoltaics, and 5¢ per kWh for concentrating solar power with thermal energy storage.

By supporting early-stage research across the solar energy technology space through this FOA, SETO can foster innovation and enable integrated multi-technology solutions that can advance the widespread adoption of solar power while securely integrating it into the nation's energy grid.

Topic 1: Advanced Solar Systems Integration Technologies describes SETO research priorities in the seamless integration of high penetrations of solar energy onto the nation's electricity grid. Responsive projects would advance the prediction, monitoring, and control of solar power production, the capabilities of solar power electronics and the integration of solar energy with synergistic technologies.

Topic 2: Concentrating Solar Thermal Power Research and Development describes SETO research priorities that support solar technologies that focus sunlight to generate and store high-temperature heat for electricity generation and other end uses. Responsive projects would contribute to increasing solar power adoption and grid reliability often through combined power and storage.

Topic 3: Photovoltaic Research and Development describes SETO research priorities that support the further development of photovoltaic technologies that improve

[4] *SunShot Vision Study*, NREL Technical Report DOE/GO-102012-3037, 2012.

[5] U.S. Dept. of Energy, *The SunShot Initiative's 2030 Goal: 3¢ per Kilowatt Hour for Solar Electricity*, 2016.

system reliability, annual energy yield, demonstrate performance of novel PV devices and develop new PV materials. Responsive projects would directly contribute to increasing PV affordability through continuous improvements in PV efficiency and reliability. SETO's work ensures that a pipeline of innovation continues to reduce PV system cost, increase power conversion efficiency, and reduce supply-chain capital expense.

Topic 4: Improving and Expanding the Solar Industry through Workforce Initiatives describes SETO research priorities that support solar workforce development. Responsive projects would focus on increasing the size of the pipeline of skilled workers being employed by the solar industry while simultaneously working to increase the participation of veterans and other talent pools, providing increased value to the solar industry as a whole.

SETO's funding supports U.S. leadership in solar technology R&D by funding the next generation of innovative technologies and by developing domestic research talent.

Historically, SETO has released separate funding opportunities that address specific stages and types of solar research. For the first time, this funding program combines SETO funding efforts into one FOA for fiscal year 2018 (FY2018). Subject to availability of funds appropriated by Congress for the purpose of this program, the availability of future-year budget authority, and approval, SETO intends to adjust topic descriptions and reopen this funding program for new applications each year relatively soon after budget guidance has been provided. By providing a more streamlined and consistent FOA strategy SETO hopes to further accelerate the advancement of solar research.

B. Topic Areas / Technical Areas of Interest

This section describes technical areas of interest for this funding opportunity in more detail. Applicants can apply to any of the topic areas below based on the scope and duration of the proposed project. Individual applications should be submitted for each topic. This solicitation intends to support research and development that advances scientific understanding. Therefore, applicants should budget and plan to disseminate any findings in peer-reviewed publications, presentations, and patents as applicable.

Topic 1 Advanced Solar Systems Integration Technologies

The Systems Integration (SI) subprogram supports early-stage research and development that advances the reliable, resilient, secure and affordable integration of solar energy onto the U.S. electric grid. For more in-depth discussion of solar grid integration, please visit "Solar Grid

Integration" https://energy.gov/eere/solar/downloads/technical-background-2018-seto-funding-opportunity-announcement.

In 2011, solar power comprised less than 0.1% of the U.S. electricity supply with an installed capacity of just 1.2 gigawatts (GW). Solar now supplies nearly 2% of the annual U.S. electricity demand[6] with an installed capacity of roughly 47 GWs[7], and is continuing to grow. According to U.S. Energy Information Administration (EIA), in some states and regions, solar represents up to 15% of total annual electricity generation. Instantaneous solar generation can reach a much higher level, more than 40% in some cases.[8]

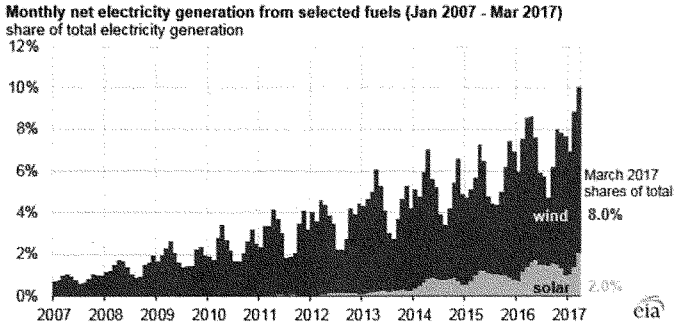


Figure 1: For the first time, in March 2017 solar supplied 2% of the U.S. electricity demand, while wind and solar combined accounted for 10% of the U.S. electricity generation. (Source: EIA)

As the penetration of solar energy on the grid continues to increase, it becomes imperative to identify the associated technical, economic and regulatory challenges, and to develop impactful solutions in order to ensure compatibility with the existing grid and a smooth transition to a secure, reliable and resilient grid of the future.

Traditional grid architecture was based on large-scale centralized generation remotely located from consumers, hierarchical control structures with minimal feedback, limited renewable

[6] U.S. Energy Information Administration (EIA), Electric Power Monthly with Data for November 2017, published in January 2018. https://www.eia.gov/electricity/monthly/current_month/epm.pdf

[7] Source: Solar Energy Industries Association (SEIA), http://www.seia.org/

[8] For example, in the California Independent System Operator (CAISO) Monthly Renewables Performance Report, the 5-minute market data shows that at the maximum solar served almost 45% of the load in September 2017. See http://www.caiso.com/Documents/MonthlyRenewablesPerformanceReport-Nov2017.html

generation such as wind and solar, limited energy storage and passive loads. A modern grid must be reliable, resilient and secure. It must have the ability to dynamically optimize grid operations and resources, rapidly detect and mitigate disturbances, engage millions if not billions more intelligent devices, integrate diverse generation sources (including both conventional and renewable types), integrate demand response and energy efficiency resources, enable customers to manage their electricity use and participate in markets, and provide strong protection against physical and cyber risks.

The current business-as-usual trajectory for the electric industry will not result in a timely transition to a modernized grid[9]. Since large investments in the past and today in the nation's electric grid infrastructure will remain in service for decades, it is important that the U.S. make smart decisions to invest in enabling and forward-looking technologies that will support the creation of a modern grid infrastructure in the coming years. There is a critical need to foster innovations and new technology adoptions by decreasing regulatory, market and business model uncertainties, demonstrating technology maturity and reducing implementation risks.

The Department of Energy's Grid Modernization Initiative[10], is a cross-cutting effort that aligns grid modernization efforts across the multiple DOE Program Offices. As part of the Grid Modernization Initiative (GMI), the SI subprogram supports targeted technology research and development (R&D) that addresses the technical challenges with achieving higher solar penetration, while supporting a safe, reliable, secure and cost-effective electric power system.

More broadly, the Grid Modernization Initiative focuses on the development of holistic solutions for the grid of the future. Several key technology areas have been identified in the Grid Modernization Multi-Year Program Plan (MYPP)[11]:

- Devices and Integrated Systems Testing;
- Sensing and Measurements;
- Systems Operations, Power Flow and Control;
- Design and Planning Tools;
- Security and Resilience; and
- Institutional Support.

Progress in all of these areas is considered crucial for the effective grid integration of solar energy and modernization of the grid, as illustrated in Figure 2. A specific focus of the SETO Systems Integration subprogram includes understanding the impacts of increasing penetration

[9] Department of Energy Grid Modernization Multiyear Program Plan (MYPP)

[10] Accessed 01 November 2017, https://energy.gov/under-secretary-science-and-energy/grid-modernization-initiative

[11] Department of Energy Grid Modernization Multiyear Program Plan (MYPP), Accessed 01 November 2017, https://energy.gov/downloads/grid-modernization-multi-year-program-plan-mypp

of solar energy on grid reliability and power quality, developing best practices for interconnecting and integrating solar with energy storage and synergistic technologies, addressing the variability of solar generation, researching power electronic technologies for flexible power flow control, enhancing situational awareness of solar generation at the grid edge and informing the standardization of interconnection, interoperability, and cybersecurity for PV and other distributed energy resources (DER) systems. Taking these all together, the goal is to advance the knowledge-base and the ability to integrate solar generation, at scale, into electric transmission and distribution systems in a cost-effective, secure, and reliable manner.

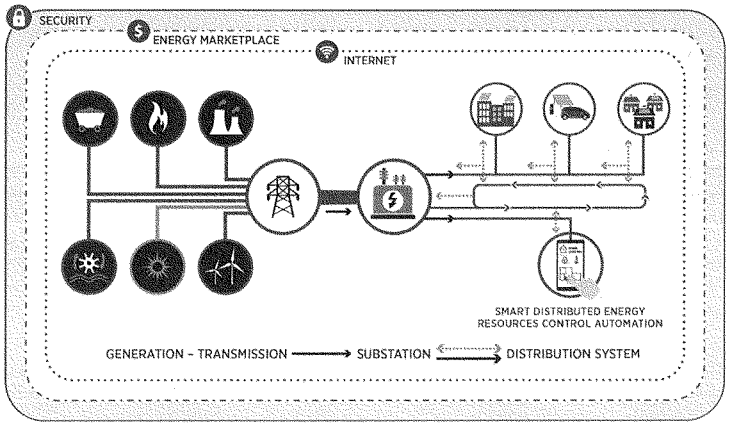


Figure 2: Illustration of high level solar penetration in a modernized electricity power system.

In this FOA the SETO Systems Integration subprogram seeks to fund research in the following topic areas:

- Adaptive Solar Grid Integration;
- Solar Observability;
- Solar + X; and
- Innovative Pathways.

Modernizing the grid also requires a workforce capable of understanding and managing this dynamic and digital environment. For those interested in developing proposals related to training the digital grid workforce of the future, please refer to Topic 4 of this FOA.

Topic 1.1 Adaptive Solar Grid Integration

This topic will support applications to research and field validate innovative technologies that enable distributed solar photovoltaic (PV) to contribute to grid reliability and resilience by providing solar dispatchability and grid-support functions—including energy, capacity, and reliability and resilience services. These technologies can be deployed throughout the electric distribution system. The approaches will focus on developing flexible interconnection requirements and dynamic hosting capacity concepts for solar PV as opposed to today's prevalent "firm" interconnection requirements and static hosting capacity planning. It is expected that the same design concepts will be applicable for energy storage and other distributed energy resources (DERs), Through the intelligent control of the distributed assets, flexible interconnection requirements can increase the overall hosting capacity for solar and DERs in the distribution system, support diverse customer interconnection choices, improve system reliability and resilience, and reduce PV curtailment. Applications must consider diverse DER options (e.g. PV, energy storage, flexible load) available as well as power systems engineering alternatives, and demonstrate the benefits of the proposed technologies in the hosting capacity analysis. It should also be shown in these solutions how a fleet of PV systems from multiple customers at multiple locations will be able to respond to fast changing conditions under normal operations and provide power to critical loads during grid outages – with consideration of other DER options and distribution system constraints. Example projects may include, but are not limited to, control hardware and software innovations for smart PV inverters and DER management system (DERMS) that allow more flexibility to interconnection and operation of small scale PV and other DER systems.

Topic 1.2 Solar Observability

This topic will support applications to research, develop and validate observability or situational awareness technologies at the grid edge to support planning and operation with high PV penetration. Primary focus areas include PV-integrated sensor technologies, secure and robust communication, advanced data analytics (including machine learning) and detection of cyber-intrusion. Projects may also be considered with secondary focus areas, which enhance grid-edge observability of solar systems by integration with additional planning, operations and business unit systems. All applications should have an assessment of economic viability of the system or component in the application and as part of the project.

Topic 1.3 Solar + X

This topic will support applications to research and field validate innovative approaches to integrate Behind-the-Meter (BTM) solar PV with synergistic technologies (including but not limited to energy storage, building controls, demand response, electric vehicles, and other

DERs) to support dispatchability and provide grid services – including energy, capacity, and reliability and resilience services – as a single control point. Projects will focus on research and development in control coordination and optimization of BTM customer-owned and co-located behind a single (master) meter: PV, storage, and other DER assets in response to broader system-wide conditions, with key interest in utilizing DER assets to provide critical power during outages. Projects may consider traditional "firm" DER interconnection requirements as well as emerging flexible interconnection approaches (such as those sought in Topic 1.1) and innovative compensation mechanisms. In an effort to minimize the overall system cost for solar integration arising from new hardware deployment, such as battery storage, , applicants are encouraged to consider how solar and load estimation, advanced data analytics, and artificial intelligence can be utilized in the operations of their proposed systems. All Applicants should have an assessment of economic viability of the system or component in the application as part of the project.

Topic 1.4 Innovative Pathways: Systems Integration

This topic will explore innovative approaches and models to accelerate the transfer of systems integration and related technologies from the lab into the real world. Rather than funding research on individual technology solutions directly, applicants will research and develop new methods to advance research portfolios of solar (and related) technologies and overcome challenges endemic to the solar technology transfer space, including knowledge gaps between the research/industrial communities and constraints on access to necessary resources. Applicants must demonstrate a realistic pathway to test, scale and sustain the model after the period of performance. Potential areas of interest include, but are not limited to, models to deploy alternative capital (e.g., local public-private partnerships, foundations) for technology R&D or transfer, structures to incentivize industry-researcher collaboration, approaches to lower barriers such that new entrants can leverage existing facilities, data and build capacity (e.g., dormant manufacturing capacity or underutilized laboratory space), and methods to drive down the cost and accelerate processes around hardware validation and certification.

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All work under EERE funding agreements must be performed in the United States. See Section IV.J.3 and Appendix C.

C. Applications Specifically Not of Interest

The following types of applications will be deemed nonresponsive and will not be merit reviewed or considered (See Section III.D of the FOA):

- Applications that fall outside the technical parameters specified in Section I.B of the FOA
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).

- Undifferentiated research, products, and/or solutions: This FOA seeks innovative solutions that help achieve SETO goals. Incremental advancement of undifferentiated or duplicative efforts is insufficient to meet SETO goals and is not of interest to this FOA.
- Projects lacking influential impact from federal funds: This FOA intends to fund projects where Federal funds will provide a clear and measurable impact, (e.g. retiring risk sufficiently for follow-on investment or catalyzing development.) Projects that have sufficient monies and resources to be executed regardless of federal funds are not of interest.
- Re-funding the same idea at the same technology readiness level: This FOA does not intend to re-fund prior SETO awardees for the same idea at the same technology readiness level.
- Applications focusing exclusively on HVAC and water heating applications are not of interest.
- Products or solutions for systems which do not tie to a grid or micro-grid (i.e. wholly off-grid applications and portable power).
- Fundamental electro-chemical battery materials research
- Hydrogen and fuel cell technologies

Any Concept Papers or Full Applications that focus on "Areas Specifically Not of Interest" will be rejected as nonresponsive and will not be considered for award.

D. Authorizing Statutes

The programmatic authorizing statute is EPACT 2005, Section 931 (a)(2).

Awards made under this announcement will fall under the purview of 2 CFR Part 200 as amended by 2 CFR Part 910.

II. Award Information

A. Award Overview

i. Estimated Funding

EERE expects to make awards based on the guidance provided in the below table (subject to the availability of appropriated funds). The cells are structured to show:

- The expected total amount of funding allocated for the subtopic

- Note: The actual funding numbers per subtopic may be somewhat higher or lower depending on the number and quality of applications within each subtopic

- The expected maximum amount (federal share) for an individual award within that subtopic
  - Note: Individual award amounts may be somewhat higher or lower than the expected amount depending on the scope of the project
- The expected award duration for a project within that subtopic
  - Note: Depending on the scope of the proposed project, some projects may have shorter durations, and in rare cases, longer durations
- The expected number of awards that could be made for the subtopic
  - Note: The actual number of awards per subtopic will depend on the number and quality of applications within each subtopic

	Topic Title	Details ($105.5M in total funding, below values are approximate)
TOPIC 1: Adaptive Local Grids, Advanced Systems Integration Technologies (20% cost share, TRL 2-5)		
Topic 1.1	Adaptive Local Grids	$18M $4.5M/award 3 years 4 awards
Topic 1.2	Solar Observability	$26M $3M/award 3 years 8 awards
Topic 1.3	Solar + X	
Topic 1.4	Innovative Pathways: Systems Integration	$2M $1.5M/award 3 years 2 awards

EERE may issue awards in one, multiple, or none of the topic areas under this FOA:

EERE may establish more than one budget period for each award and fund only the initial budget period(s). Funding for all budget periods, including the initial budget period, is not guaranteed.

Attachment 2
Intermediate FOA Replacement
Supplied by Acting EE1 Tripodi

Reference 1;
Production 1 - HQ-2018-01594-F First Partial Responsive Documents page 35-36

TOPIC 11 Solar Grid Integration

This topic will support applications to research and field validate unique and innovative solutions that will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Specifically, the solutions should identify the strategic location of solar photovoltaic (PV) systems that will ensure the Energy Sector provides continuity of service in the face of wide spread and coordinated threats. These solutions can be deployed throughout the bulk power systems or associated transmission to distribution substations. It is expected that the same design concepts will be applicable for energy storage and other distributed energy resources (DERs). The approaches will test the systems' ability to operate and adapt at both steady and degraded states. Applications must consider diverse DER options (e.g. photovoltaics, energy storage, and flexible load) available as well as power systems engineering alternatives, and demonstrate the benefits of the proposed solutions. It should also be shown in these solutions how a fleet of multiple photovoltaics systems from multiple locations will be able to respond to fast changing conditions under normal operations and provide power to critical loads during grid outages – with consideration of other DER options and distribution system constraints. Example projects may include, but are not limited to, new design and use-case concepts, essential reliability services, adaptive capabilities, voltage support, previously uncontemplated and unique capabilities and control hardware and software innovations for smart PV inverters and DER management systems. Applications must have an assessment of economic viability of the proposed system, activity or component in the respective part of the project.

Applicant's solar photovoltaic projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These solar photovoltaic projects shall seek to reduce vulnerabilities, minimize consequences, identify and disrupt threats, and hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

TOPIC 12 Solar Situational Awareness and Analysis

This Topic will support applications to research and field validate unique and innovative solutions that will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Specifically, the solutions should enhance operator capability to observe solar systems deployed throughout the bulk power systems or associated transmission to distribution substations or Behind-the-Meter (BTM) solar including but not limited to battery storage, systems controls, and demand response. Primary focus areas include solar photovoltaic integrated sensor technologies, secure and robust electricity supply delivery and communication tools, advanced data analytics including Artificial Intelligence and Machine to Machine capabilities, and voltage testing. Projects with secondary focus areas may also be considered which include the integration of observed data into planning, operations and business unit systems that would operate at both steady and degraded states. Applications must have an assessment of economic viability of the proposed system, activity or component in the respective part of the project.

Applicant's solar situational awareness and analysis projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These projects shall seek to contribute to one or more risk components: reduce vulnerabilities, minimize consequences, identify and disrupt threats, and/or hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

TOPIC 1.3 Solar Technology Transfer

This topic will explore unique and innovative approaches to accelerate the transfer of solar system solutions that will improve the resiliency of the Energy Sector's capability to withstand all hazards; focusing on cyber and physical vectors. Potential areas of interest include, but are not limited to, projects or models that deploy alternative capital, for technology R&D transfer, incentivize industry-researcher collaboration, leverage existing facilities or capabilities, data and build approaches and methods that serve to drive down the hardware cost and ensure solutions, validation, certifications, resilience and electricity supply to withstand wide spread and coordinated threats compatible with Topic 1.1 and Topic 1.2

Applicant's solar technology transfer projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These projects shall seek to contribute to one or more risk components: reduce vulnerabilities, minimize consequences, identify and disrupt threats, and/or hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

Attachment 3

Final "Topic 1" Replacement FOA 1987 - Abbreviated

Complete FOA in Reference 15:
DE-FOA-0001987 Advanced Systems Integration for Solar Technologies

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Department of Energy (DOE)
Office of Energy Efficiency and Renewable Energy (EERE)

Advanced Systems Integration for Solar Technologies:
Solar Situational Awareness and Resilient Solutions for Critical Infrastructure

Funding Opportunity Announcement (FOA) Number: DE-FOA-0001987
FOA Type: Initial
CFDA Number: 81.087

FOA Issue Date:	10/15/2018
Letter of Intent Due Date	11/14/2018 5:00pm EST
Submission Deadline for Full Applications:	12/7/2018 5:00pm ET
Expected Submission Deadline for Replies to Reviewer Comments:	2/1/2019 5:00pm ET
Expected Date for EERE Selection Notifications:	3/22/2019
Expected Timeframe for Award Negotiations	60 days

- To apply to this FOA, applicants must register with and submit application materials through EERE Exchange at https://eere-Exchange.energy.gov, EERE's online application portal.

- Applicants must designate primary and backup points-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations. If an application is selected for award negotiations, it is not a commitment to issue an award. It is imperative that the applicant/selectee be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancelation of further award negotiations and rescission of the Selection.

I. Funding Opportunity Description

A. Description/Background

This Funding Opportunity Announcement (FOA) is being issued by the U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE), Solar Energy Technologies Office (SETO). This section describes the overall goals of SETO and the type of projects that are being solicited through this FOA.

In 2016, solar power surpassed 1% of annual electricity supply in the United States for the first time, and the Energy Information Administration projects that solar will grow to 5% of U.S. electricity by 2030.[1] Further, if the price of solar electricity and/or energy storage declines more rapidly than projected, that percentage could be even higher.[2] But solar is more than just a source of affordable electricity; it also provides the potential to improve grid reliability and resilience, increase employment,[3] create business opportunities, increase energy diversity, and provide environmental benefits.

The mission of the Solar Energy Technologies Office (SETO) is to support early-stage research and development to improve the performance and flexibility of solar technologies that contribute to a reliable and resilient U.S. electric grid. The office invests in innovative research efforts that securely integrate more solar energy into the grid, enhance the use, storage and dispatch of solar energy, and lower solar electricity costs.

SETO focuses on two different solar energy technologies: photovoltaic (PV) technologies that directly convert sunlight into electricity, typically via a semiconductor, and concentrating solar thermal power (CSP) technologies that convert sunlight to heat, which can be converted or stored until needed and then used to generate electricity or provide other energy services. Because sunshine varies with the time of day, location, and season, solar power systems must be paired with adaptive loads, other sources of power, or energy storage to deliver electricity whenever it's needed. This dependency reduces the value of solar power systems once solar starts to supply a significant fraction of the electricity within a given region and highlights the need for a focus on addressing grid integration challenges.

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[1] U.S. Department of Energy, Energy Information Administration, International Energy Outlook 2017, DOE/EIA-0484 (2017).
[2] P.A. Basore and W.J. Cole, "Comparing supply and demand models for future photovoltaic power generation in the USA," submitted to *Progress in Photovoltaics: Research and Applications*, 2017.
[3] The Solar Foundation, *National Solar Jobs Census*, 2010 – 2016.

SETO, in partnership with other offices at DOE, launched the SunShot Initiative in February 2011 with the goal of solar electricity becoming price-competitive with conventional utility sources by 2020.[4] The SunShot 2020 goal has already been achieved for utility-scale PV, and with continued effort, it is likely to be achieved for grid-tied solar applications. As a result of this tremendous progress and in response to the growing deployment of solar in the U.S., SETO is increasing its focus on addressing the challenges related to seamlessly integrating high penetrations of solar energy onto the nation's electricity grid. Additionally, SETO set 2030 cost targets to further reduce the cost of solar electricity across all market sectors, which would make solar one of the most affordable sources of electricity and enable a substantial fraction of U.S. electricity demand to be supplied by solar technology.[5] The targets for the unsubsidized cost of electricity at the point of grid connection in a location with average U.S. solar resources are 3¢ per kilowatt-hour (kWh) for utility-scale photovoltaics, 4¢ per kWh for commercial rooftop photovoltaics, 5¢ per kWh for residential rooftop photovoltaics, and 5¢ per kWh for concentrating solar power with thermal energy storage.

By supporting early-stage research across the solar energy technology space through this FOA, SETO can foster innovation and enable integrated multi-technology solutions that can advance the widespread adoption of solar power while securely integrating it into the nation's energy grid.

DOE is committed to improving the affordability of energy technologies and strengthening the Energy Sector's capability to withstand cyber and physical threats, including natural disasters. Improving the strategic location and situational awareness of solar systems can help ensure continuity of service in the face of widespread and coordinated threats. Developing innovative approaches to accelerate the transfer of solar system solutions that will improve Energy Sector resilience is also a priority.

The Systems Integration (SI) subprogram supports early-stage research and development that advances the reliable, resilient, secure and affordable integration of solar energy onto the U.S. electric grid. For more in-depth discussion of solar grid integration, please visit "Solar Grid Integration" https://energy.gov/eere/solar/downloads/technical-background-2018-seto-funding-opportunity-announcement.

[4] *SunShot Vision Study*, NREL Technical Report DOE/GO-102012-3037, 2012.
[5] U.S. Dept. of Energy, *The SunShot Initiative's 2030 Goal: 3¢ per Kilowatt Hour for Solar Electricity*, 2016.

In 2011, solar power comprised less than 0.1% of the U.S. electricity supply with an installed capacity of just 1.2 gigawatts (GW). Solar now supplies nearly 2% of the annual U.S. electricity demand[6] with an installed capacity of roughly 47 GWs[7], and is continuing to grow. According to the U.S. Energy Information Administration (EIA), in some states and regions, solar represents up to 15% of total annual electricity generation. Instantaneous solar generation can reach a much higher level, more than 40% in some cases.[8]

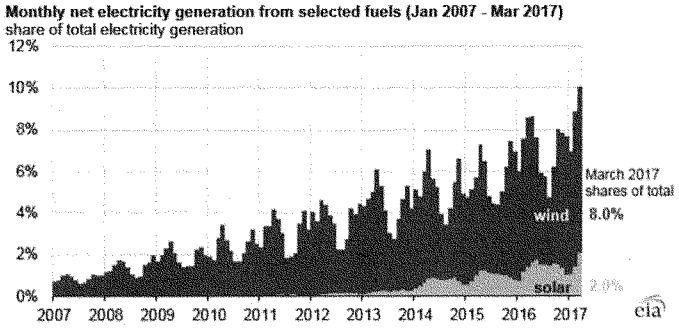

Figure 1: For the first time, in March 2017 solar supplied 2% of the U.S. electricity demand, while wind and solar combined accounted for 10% of the U.S. electricity generation. (Source: EIA)

As the penetration of solar energy on the grid continues to increase, it becomes imperative to identify the associated technical, economic and regulatory challenges, and to develop impactful solutions in order to ensure compatibility with the existing grid and a smooth transition to a secure, reliable and resilient grid of the future.

Traditional grid architecture was based on large-scale centralized generation remotely located from consumers, hierarchical control structures with minimal feedback, limited renewable generation such as wind and solar, limited energy storage and passive loads.

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A modern grid must be reliable, resilient and secure. It must have the ability to dynamically optimize grid operations and resources, rapidly detect and mitigate disturbances, engage millions if not billions more intelligent devices, integrate diverse generation sources (including both conventional and renewable types), integrate demand response and energy efficiency resources, enable customers to manage their electricity use and participate in markets, and provide strong protection against physical and cyber risks.

The current business-as-usual trajectory for the electric industry will not result in a timely transition to a modernized grid[9]. Since large investments in the past and today in the nation's electric grid infrastructure will remain in service for decades, it is important that the U.S. make smart decisions to invest in enabling and forward-looking technologies that will support the creation of a modern grid infrastructure in the coming years. There is a critical need to foster innovation and new technology adoption by decreasing regulatory, market, and business model uncertainties, demonstrating technology maturity and reducing implementation risks.

The Department of Energy's Grid Modernization Initiative[10], is a cross-cutting effort that aligns grid modernization efforts across the multiple DOE Program Offices. As part of the Grid Modernization Initiative (GMI), the SI subprogram supports targeted technology research and development (R&D) that addresses the technical challenges with achieving higher solar penetration, while supporting a safe, reliable, secure, and cost-effective electric power system.

More broadly, the Grid Modernization Initiative focuses on the development of holistic solutions for the grid of the future. Several key technology areas have been identified in the Grid Modernization Multi-Year Program Plan (MYPP)[11]:

- Devices and Integrated Systems Testing;
- Sensing and Measurements;
- Systems Operations, Power Flow and Control;
- Design and Planning Tools;
- Security and Resilience; and
- Institutional Support.

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[9] Department of Energy Grid Modernization Multiyear Program Plan (MYPP)

[10] Accessed 01 November 2017, https://energy.gov/under-secretary-science-and-energy/grid-modernization-initiative

[11] Department of Energy Grid Modernization Multiyear Program Plan (MYPP), Accessed 01 November 2017, https://energy.gov/downloads/grid-modernization-multi-year-program-plan-mypp

Progress in all of these areas is considered crucial for the effective grid integration of solar energy and modernization of the grid, as illustrated in Figure 2. A specific focus of the SETO Systems Integration subprogram includes understanding the impacts of increasing penetration of solar energy on grid reliability and power quality, developing best practices for interconnecting and integrating solar with energy storage and synergistic technologies, addressing the variability of solar generation, researching power electronic technologies for flexible power flow control, enhancing situational awareness of solar generation at the grid edge and informing the standardization of interconnection, interoperability, and cybersecurity for PV and other distributed energy resources (DER) systems. Taking these all together, the goal is to advance the knowledge-base and the ability to integrate solar generation, at scale, into electric transmission and distribution systems in a cost-effective, secure, and reliable manner.

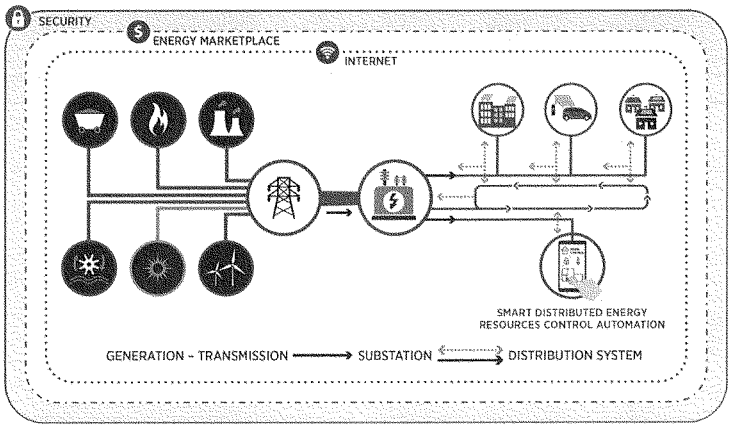

Figure 2: Illustration of high level solar penetration in a modernized electricity power system.

B. Topic Areas/Technical Areas of Interest

Topic 1.1 R&D and Technology Transfer for solar situational awareness in strategic locations associated with critical infrastructure

Situational awareness of solar photovoltaic (PV) systems in strategic locations is vital to managing risk and strengthening the security and resilience of the Nation's critical infrastructure (e.g., for safety, public health and national security). Further, the increasing deployment of utility-scale and distributed solar PV systems brings about challenges to electric power grid planning and operation. As more solar energy systems come online, grid operators across the country need new tools to ensure the secure, resilient and reliable operation of our nation's electric grid and delivery of energy services to our critical infrastructure.

This Topic will support applications to conduct R&D and technology transfer of unique and innovative solutions that will enhance grid operator's situational awareness of solar energy systems deployed throughout the bulk power system, associated substations, distribution system and/or Behind-the-Meter (BTM). Specifically, the solutions should focus on the situational awareness of solar photovoltaic (PV) systems in strategic locations with considerations of cyber and physical vectors to ensure the electric power grid provides continuity of service in the face of wide spread and coordinated threats. The project must result in greater resilience and assure energy services to the Nation's critical infrastructure.

Applications must consider diverse DER options (e.g. photovoltaics, energy storage, and flexible load) available as well as power systems engineering alternatives, and demonstrate the benefits of the proposed solutions. It should also be shown in these solutions how a fleet of multiple photovoltaics systems from multiple locations will be able to respond to fast changing conditions under normal operations and provide power to critical loads during grid outages – with consideration of other DER options and distribution system constraints. Example projects may include, but are not limited to, new design and use-case concepts, essential reliability services, adaptive capabilities, voltage support, previously uncontemplated and unique capabilities and control hardware and software innovations for smart PV inverters and DER management systems.

Technological advancements include control/coordination strategies, real-time system monitoring, robust communication structures, grid planning and analytical platforms, and integration of multiple DER technologies.

Primary focus areas include solar photovoltaic integrated sensor technologies, secure and robust communication tools, advanced data analytics including

machine learning and artificial Intelligence, machine to machine capabilities, and data visualization. Projects should consider the integration of observed data into planning, operations and business unit systems that would operate at both steady and degraded states. The research should leverage established industrial control and power system cyber security work to implement state-of-the-art cyber security best practices for solar PV systems. Applications must also have an assessment of economic viability of the proposed system, activity or component. The project results are expected to develop the situational awareness tools and improve resilience in strategic locations associated with the critical infrastructure.

Applicants must explore unique and innovative approaches to accelerate the transfer of solar technology solutions that improve the solar situation awareness. Potential areas of interest may include, but are not limited to, projects or models that deploy alternative capital for technology R&D transfer, incentivize industry-researcher collaboration, leverage existing facilities or capabilities, data and build approaches and methods that serve to drive down the hardware cost and ensure solutions, validation, certifications, resilience and electricity supply can withstand wide spread and coordinated threats.

Applicants are encouraged to work with critical infrastructure owners and operators, industry, academia, and other stakeholders including state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof.

Topic 1.2 R&D, Technology Transfer and Validation of proactive resilience solutions for critical infrastucture.

This topic seeks applications that will conduct the R&D and technology transfer under Topic 1.1 and also include field validation. Validation should demonstrate how unique and innovative solutions enhance resiliency of the bulk power system and/or distribution systems (including microgrids) with high penetrations of solar PV systems. Specifically, the solutions validated should identify the strategic location of solar photovoltaic (PV) systems that will ensure the Energy Sector provides continuity of service to critical infrastructure in the face of wide spread and coordinated threats; focusing on cyber and physical vectors.

Field validation must be applicable and associated with critical infrastructure that verifies the viability of system design, validates architecture relationships and interoperability, ensures protection of system networks and data against cyber

threats, and informs functional requirements for bulk and distribution system planning platforms and decision support tools. The Applicant must demonstrate through data and information that the technology solutions result in greater resilience and assure energy services to the Nation's critical infrastructure.

Applications must have an assessment of economic viability of the proposed system, activity or component in the respective part of the project. Applicant's solar photovoltaic projects may require working with critical infrastructure owners and operators and state, local, tribal and territories entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof. These solar photovoltaic projects shall seek to reduce vulnerabilities, minimize consequences, identify and disrupt threats, and hasten response and recovery efforts related to critical infrastructure to ensure public health and safety while improving national security and economic security.

Applicants must explore unique and innovative approaches to accelerate the transfer of solar technology solutions that improve the solar situation awareness. Potential areas of interest may include, but are not limited to, projects or models that deploy alternative capital for technology R&D transfer, incentivize industry-researcher collaboration, leverage existing facilities or capabilities, data and build approaches and methods that serve to drive down the hardware cost and ensure solutions, validation, certifications, resilience and electricity supply can withstand wide spread and coordinated threats.

Cybersecurity and Interoperability: Applicants should describe their strategies and plans for establishing and maintaining interoperability, and the utilization of open standards wherever possible. Applicants should consider interoperability within their solution (among devices and/or subsystems) and at the external interfaces with other utility and customer systems. Applicants shall indicate where they have chosen to utilize proprietary standards.

Applicants should also describe their approach to establishing and maintaining cybersecurity throughout their solution, and at the interfaces to external components and systems. In accordance with the cybersecurity technique of defense-in-depth, applicants shall not cede responsibility for cybersecurity to the external boundaries of their proposed solution, nor shall they propose that it be added on at some later stage.

Post award, Recipients will be required to submit an Interoperability Plan and a Cybersecurity Plan, detailing how they propose to implement and maintain these aspects of their solution.

Anticipated Phases and Cost Share Requirement by Topic

The following table illustrates the anticipated focus and required cost share by phase for each topic, along with the anticipated timeframes for each phase:

	Year 1	Year 2	Year 3
Topic 1.1: R&D and Technology Transfer for solar situational awareness	Research and development (20% cost share)		
Topic 1.2: R&D, Technology Transfer and Validation of proactive resilience solutions	Phase 1: Research and development (20% cost share)		Phase 2: Field validation (50% cost share)

While the phases identify the type of activity and required cost share, each project will be divided into three one year budget periods, with go/no-go decision points between each budget period.

All work under EERE funding agreements must be performed in the United States. See Section IV. H.iii and Appendix C.

C. Applications Specifically Not of Interest

The following types of applications will be deemed nonresponsive and will not be reviewed or considered (See Section III.D of the FOA):

- Applications that fall outside the technical parameters specified in Section I.B of the FOA.
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).
- Undifferentiated research, products, and/or solutions: This FOA seeks innovative solutions that help achieve SETO goals. Incremental advancement of undifferentiated or duplicative efforts is insufficient to meet SETO goals and is not of interest to this FOA.
- Projects lacking influential impact from Federal funds: This FOA intends to fund projects where Federal funds will provide a clear and measurable impact, (e.g. retiring risk sufficiently for follow-on investment or catalyzing development.) Projects that have sufficient monies and resources to be executed regardless of federal funds are not of interest.
- Re-funding the same idea at the same technology readiness level: This FOA does not intend to re-fund prior SETO awardees for the same idea at the same technology readiness level.

- Products or solutions for systems which do not tie to a grid or micro-grid (i.e. wholly off-grid applications and portable power).
- Generic technologies or solutions that are not integrated with solar PV. These include sensor and measurement, communications, and cyber security.

D. Authorizing Statutes

The programmatic authorizing statute is EPACT 2005, Section 931 (a)(2).

Awards made under this announcement will fall under the purview of 2 CFR Part 200 as amended by 2 CFR Part 910.

II. Award Information

A. Award Overview

i. Estimated Funding

EERE expects to make approximately $46 million of Federal funding available for new awards under this FOA, subject to the availability of appropriated funds. EERE anticipates making approximately 10 awards under this FOA. EERE may issue one, multiple, or no awards. Individual awards may vary between $2 and $10 million.

EERE may issue awards in one, multiple, or none of the topic areas.

EERE may establish more than one budget period for each award and fund only the initial budget period(s). Funding for all budget periods, including the initial budget period, is not guaranteed.

Attachment 4

FOA Development Standard Operating Procedure

Glossary – page 3

Reference 1;
Production 1 - HQ-2018-01594-F First Partial Responsive Documents pages: 74-111

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

EERE S 540.110

FOA Development Standard Operating Procedure

Template Version 8/31/2018

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I. Executive Summary

The Office of Energy Efficiency and Renewable Energy (EERE) partners with industry, universities, nonprofits and others to advance the use of renewable energy and energy efficiency technologies. EERE encourages the growth of these technologies by offering financial assistance opportunities for their outreach, research, development and demonstration. To further this goal, EERE publishes Funding Opportunity Announcements (FOAs) through which the public may submit applications for financial assistance awards.

Standard Operating Procedures (SOPs) articulate EERE's commitment to a strong program planning and project management capability. These SOPs represent a broad set of business practices that demonstrate EERE's proficiency as a steward of the public's trust in the commitment, obligation, and expenditure of federally-appropriated funds.

The FOA Development process documented in this SOP begins when a Technology Office identifies the need for a particular set of projects to advance their mission, and prepares a FOA based on that defined need. During this phase, the Technology Office defines the requirements for the FOA and convenes a team to coordinate and manage the development process. The FOA Team creates a FOA Requirements Document (FRD) which outlines key features of the FOA. After FRD approval, the FOA Team drafts the FOA and coordinates review. EERE then ensures DOE has approved the FOA concept, coordinates congressional notification (if applicable), and publishes the FOA. The FOA Development Phase ends with limited post-publication activities, including an optional webinar, a question and answer forum for potential applicants, and any necessary modifications to the FOA.

The additional financial assistance-related processes below can be found in separate SOPs:

- **Evaluation and Selection:** The process for evaluating and selecting applicant proposals under a competitive FOA.
- **Award Negotiations:** EERE conducts activities to resolve key issues with selected applicants (now referred to as selectees) and negotiates awards.
- **Active Project Management:** EERE utilizes Active Project Management (APM) to support the goal of achieving the highest possible mission impact for the taxpayer investment.
- **GFO Closeout SOP:** EERE closes out projects in a timely manner and makes the results of research publicly available.

Applicability: The FOA Development SOP applies to all EERE competitive FOAs. This SOP does not apply to formula grants or non-competitive actions (e.g., Determination of Non-Competitive Financial Assistance (DNFAs)).

Future Updates: The EERE Change Control Board manages changes to this SOP and related templates (for applicability and process, see the EERE OBO Directives SOP). The Change Control Board considers input from subject matter experts from the EERE Technology Offices, Operations Offices, the Golden Field Office (GFO) and the National Energy Technology Laboratory (NETL) to ensure that the process documented in the FOA SOP continues to improve and reflect the business practices that improve efficiency and add value to EERE staff.

II. Abbreviations

ASEE	Assistant Secretary of Energy Efficiency & Renewable Energy
CI	Office of Congressional and Intergovernmental Affairs (DOE)
CFO	Chief Financial Officer
CO	Contracting Officer
COI	Conflict of Interest
CS	Contract Specialist (NETL)
DAS	Deputy Assistant Secretary
DOE	Department of Energy
DNFA	Determination of Non-competitive Financial Assistance
DRE	Determination of Restricted Eligibility
EERE	Energy Efficiency & Renewable Energy
FAO	Financial Assistance Office (GFO)
FFRDC	Federally Funded Research and Development Center(s)
FOA	Funding Opportunity Announcement
FRD	FOA Requirements Document
GFO	Golden Field Office
GMS	Grants Management Specialist (GFO)
HCA	Head of Contracting Activity
HQ	Headquarters
IP	Intellectual Property
IPLD	Intellectual Property Law Division (GFO)
MA	Office of Management (DOE)
MA-62	Office of Contract Management (DOE)
MYPP	Multi-Year Program Planning
NDA	Non-Disclosure Acknowledgement
NEPA	National Environmental Policy Act
NETL	National Energy Technology Laboratory
NCO	NEPA Compliance Officer (GFO)
OBO	Office of Business Operations (EERE)
OGC	Office of General Counsel (DOE)
PA	Office of Public Affairs (DOE)
PCN	Priority Congressional Notification
PMCO	Project Management Coordination Office
PDAS	Principal Deputy Assistant Secretary (performs ASEE role in absence of political appointee)
POC	Point of Contact
SO	Selection Official
SOP	Standard Operating Procedure(s)
TM/PM	Technology Manager/Project Manager
TPO	Technical Project Officer

III. Roles and Responsibilities

The roles and responsibilities identified in the table below provide a high-level overview of the responsibilities for each role as they relate to FOA development. This is only an overview and does not reflect every step required of each role. For more information, see the relevant sections within this SOP.

Roles and Responsibilities	
Assistant Secretary for EERE (ASEE)	• Receives MA FOA Cover Sheet briefing from Technology Office Director and FOA Manager • Briefs DOE Review Team and/or MA on the FOA concept
Deputy Assistant Secretary (DAS)	• Approves annual FOA List for his/her sector • Consults on the MA FOA Cover Sheet when requested by Technology Office Director • Concurs on Determinations of Restricted Eligibility (DREs) • Reviews FOA-specific Cost Share Reduction or Waiver Determinations • Approves public announcements for FOA publication
DAS Chief of Staff	• Works with Office of DAS-O and ASEE to schedule FOA briefings • Submits final MA FOA Cover Sheet to Office of DAS-O
Technology Office Director	• Identifies all FOAs to be issued and included on the annual FOA list • Assigns the FOA Manager • Reviews and approves the MA FOA Cover Sheet and the FRD • Reviews and accountable for the Notice of Intent (NOI) and the FOA • May review and edit public announcement • Serves as the Selection Official, with some limited exceptions
Selection Official	• Reviews and approves the FRD
Operations Supervisor	• Ensures MA Work Plan data is accurate and ready for submission to MA on a weekly basis
FOA Manager[1]	• Leads development of FOA concept • Develops FOA schedule • Leads development, review, and approval of FRD and FOA • Organizes and leads FOA Strategy Meeting with representatives from business offices • Drafts key documents throughout the FOA process, including RFI, MA FOA Cover Sheet, FRD, NOI, and FOA. Leads development,

[1] The DOE Merit Review Guide for Financial Assistance (2017) references a "Federal Merit Review Chairperson." Under the current EERE policy, the FOA Manager assumes the duties of the Federal Merit Review Chairperson along with other duties. To reflect current EERE Policy, this document refers to the FOA Manager. The FOA Manager role is typically performed by a Technology Manager or Program Manager.

Roles and Responsibilities	
	review, and approval of FOA-related documents. • Leads development, review, and approval of supplemental documents (if required), including FOA-specific Cost Share Reduction or Waiver Determination, Determination of Restricted Eligibility and FOA-specific Evaluation and Selection Plans • Works closely with Technology Office Communications Lead and EERE Communications team to develop (and obtain approval for) public announcements and congressional notifications (and related materials) in advance of FOA publication
Technical Project Officer (TPO)[2]	• Performs FOA Manager tasks as delegated by the FOA Manager • Creates Requisitions, as needed
DOE Business Clearance	• Sends an annual request to the Head of Contracting Activity (HCA) for upcoming EERE FOAs and selects FOAs for review • Reviews selected FOAs and provides comments to the Contracting Officer for incorporation into the FOA • If selected for review, provides concurrence before the FOA may be published
Head of Contracting Activity (HCA)	• As the senior contracting official, has ultimate responsibility for ensuring that management systems, awards, and administration of financial assistance are in accordance with laws, regulations, and DOE policies • Ensures that agency policies and procedures are implemented • Establishes review and approval levels for financial assistance actions • Appoints Contracting Officers • Designates Selection Officials for FOAs under $50 million[3] (Senior Procurement Executive designates for FOAs at or above $50 million) • Reviews new FOAs if the total value is over $25 million • Signs the Section 301 Congressional Notification letter, if applicable[4]
Contracting Officer (CO)	• Authorized to obligate government funds for financial assistance and execute awards on behalf of DOE • Advises FOA Team on award type, FOA, evaluation, selection, and finalization of the award • Responsible for business management and non-program aspects of the financial assistance process

[2] In some cases, the FOA Manager may also serve the role as Technical Project Officer.

[3] To calculate the $50M threshold, both DOE share and cost share are included.

[4] At NETL, delegated to the Procurement Director. At GFO, delegated to the Financial Assistance Office Director for FOAs < $25M.

Roles and Responsibilities	
	• Ensures the integrity of the competitive procurement process • Serves as a focal point for dissemination and interpretation of financial assistance regulations, policies, and procedures • Concurs on FRD and the Evaluation and Selection Plan • Participates in the FOA Strategy Meeting • Coordinates with Legal Counsel regarding any legal issues with FOA • Coordinates any Business Clearance or Head of Contracting Activity review (if applicable) and coordinates any related edits to the FOA • Reviews and concurs on FOA-specific Cost Share Reduction or Waiver Determinations and Determinations of Restricted Eligibility (if applicable) • Reviews all applicable congressional notifications • Publishes the RFI, NOI, FOA and any FOA Modifications • Responsible for the official FOA and award records in STRIPES and ensures the GMS has all necessary documents for the official record and that they are uploaded to STRIPES
Grants Management Specialist (GMS)/Contract Specialist (CS)	• Supports the Contracting Officer in all activities • Primarily responsible for record-keeping and publication of important FOA information, including maintaining the official FOA record in STRIPES, publishing announcements in Exchange and on grants.gov, and ensuring signed COI/NDAs are in official record • Participates in the development of the FOA, including review of FRD and related documents • Participates in the FOA Strategy Meeting • Prepares and sends required Congressional Notifications • Coordinates and publishes responses to all applicant questions to the FOA
Legal Counsel[5]	• Provides legal advice to the FOA Team throughout development of the FOA • Prepares the FOA-specific Selection Official Designation Memorandum, if blanket designations cannot be used • Participates in the FOA Strategy Meeting • Advises the FOA Team with respect to the Evaluation and Selection Plan and any proposed non-standard approaches • Concurs on FRD and Evaluation and Selection Plan • Reviews and concurs on RFI, NOI, FOA-specific Cost Share

[5] For purposes of this SOP, Legal Counsel refers to Field Counsel or GFO's Office of Chief Counsel. It does not refer to General Counsel, which is at HQ. The Office of General Counsel (OGC) role in this FOA SOP process is limited, except where Business Clearance is involved.

Roles and Responsibilities	
	Reduction or Waiver Determinations (if applicable), Determinations of Restricted Eligibility (if applicable), FOA and FOA Modifications • Advises on responses to applicant questions or clarification of the FOA requirements (e.g. eligibility) as requested by the CO
Intellectual Property (IP) Counsel	• Leads development of an IP Strategy for the FOA • Provides advice on IP issues throughout the FOA process • Participates in the FOA Strategy Meeting • Provides IP language to include in the FOA • Prepares or adapts any required IP forms for the FOA
National Environmental Policy Act (NEPA) Staff	• Participates in the development of a NEPA strategy for the FOA • If the FOA clearly intends to fund *only* projects limited to certain administrative activities, the NEPA Compliance Officer (NCO) may categorically exclude the entire FOA or entire topic areas from further NEPA review • Provides NEPA language and any required NEPA forms for the FOA • Participates in the FOA Strategy Meeting
Technology Office Communications Lead	• In consultation with the FOA Manager, coordinates public announcement strategy with the EERE Communications POC • Works with the FOA Manager in planning, drafting, documenting and obtaining approval for a public announcement • Updates the EERE policy calendar, as needed
EERE Communications POC	• Provides support and advice to the Technology Office Communications Lead and FOA Manager throughout all public announcement processes and edits public announcements, as needed • Sends green light emails for publishing FOAs, and sending congressional notifications (if applicable) • Publishes approved public announcements on EERE website

IV. Initial FOA Planning

Schedule Note: Initial planning will take place from approximately February through May. The final Annual FOA List should be complete no later than the end of August. For the most up to date deadlines for the current year, refer to the applicable FY FOA Memo and the latest EERE Business Calendar.

A. FOA Concept Development

Each Technology Office will determine its own method for brainstorming FOA ideas, including, but not limited to:

- Technology Roadmaps
- Multi-Year Program Planning (MYPP)
- Overall Program Goals and Objectives
- Administration Priorities
- DOE and EERE Initiatives
- Stakeholder Inputs (e.g., Request for Information (RFI)[6], Public Workshops[7])
- Current Technology Office Portfolio
- Congressional Appropriations
- Congressional Direction
- State of Technology
- "FOA Fest" planning meetings

B. FOA Scenario Planning

Each Technology Office must respond to an annual information management (IM) request for potential FOAs for the upcoming fiscal year. In recent years, Congress has not enacted a final budget for EERE until the second or third quarter of the fiscal year, so the FOA Scenario Planning IM is the Technology Office's projection of what FOAs they will publish under varying budget scenarios (e.g., the Presidential Request level, the House Mark, the Senate Mark, or a full-year continuing resolution). This information may be collected as part of the Budget Execution Spend Plan IM or separately.

C. Annual FOA List

Using the results of the FOA Scenario Planning IM, each EERE sector will identify all

[6] RFIs that are intended to inform the development of a FOA must have DOE Approval prior to publishing (see Section V DOE Review and Approval Process). For more information on RFIs (whether associated with a FOA or not) refer to the RFI Template.

[7] All Public Workshops must be published to the Federal Register in addition to EERE Exchange. See Federal Register Process (Workshops) for more information.

of its proposed FOAs for the year and will rank them in priority order. The aggregated list will serve as a basis for workload planning and strategy planning for the DAS, Technology Office Director, and the Office of Business Operations (OBO).

Step 1: The Technology Office inputs FOA information as specified in the IM request (see Section IV.B FOA Scenario Planning).

Step 2: The Technology Office Director assigns a FOA Manager to each FOA on the list.

Step 3: PMCO creates an Annual FOA List based on the information in the IM results and routes to each sector DAS.

Step 4: **APPROVAL:** The DAS reviews the list and provides approval for his/her sector.

Step 5: PMCO distributes the approved Annual FOA List to GFO Financial Assistance Office and to NETL.

D. Business Clearance Review Initiated

Step 1: Business Clearance sends an annual request to the Head of Contracting Activity (HCA) for upcoming FOAs.

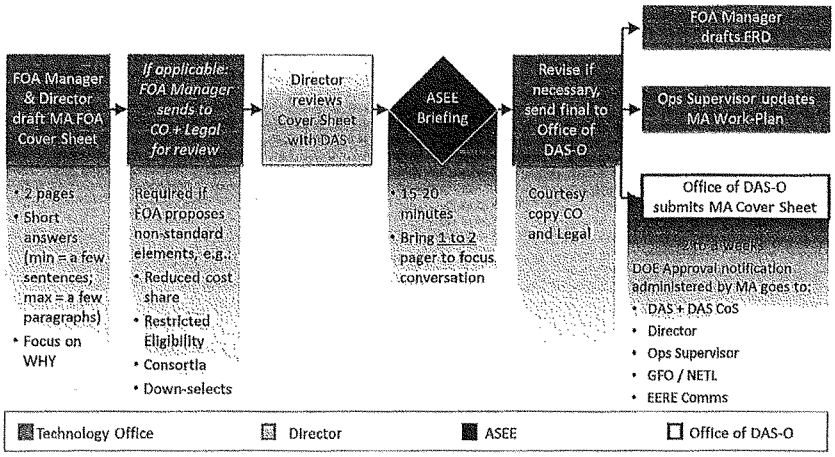
Step 2: The HCA sends high level FOA information (e.g. Technology Office, total funding amount, title of FOA, brief description, etc.) as specified in the Business Clearance request.

Step 3: Business Clearance determines which FOAs to review. For the complete Business Clearance process, see: https://www.energy.gov/sites/prod/files/2018/02/f49/FY18%20Acquisition%20Guide_FY2018_v3.pdf#chapter71.1.

V. DOE Review and Approval Process

Purpose: The DOE approval process was instituted DOE-wide in 2017 to ensure that all financial assistance actions, whether competitive (FOAs) or non-competitive (DNFAs), align with the Administration's energy priorities. The process is facilitated by the DOE Office of Management (MA). The approval requirement is not specific to EERE, rather, it applies to any office that conducts financial assistance actions across the DOE complex (e.g., Office of Electricity, Office of Fossil Energy, Office of Science, ARPA-E, etc.).

DOE Review and Approval Process (Figure 1)



A. MA FOA Cover Sheet

Step 1: The FOA Manager drafts the MA FOA Cover Sheet with input from the Technology Office Director and other Technology Office staff, as appropriate.

- If the FOA will include non-standard elements (e.g., cost share below the statutory minimum, restricted eligibility, consortia model, down-selection process, etc.), the FOA Manager must submit the MA FOA Cover Sheet for review to the CO and Legal Counsel that typically support the Technology Office. The CO and Legal Counsel review should occur before the MA FOA Cover Sheet is submitted to the DAS.
- The purpose of the CO and Legal Counsel review is to identify potential legal or contracting issues that could impact the proposed approach and provide early notification of non-standard elements that require more time to address than the standard review process allows (e.g., cost share waiver).

Step 2: The Technology Office Director consults with the DAS on the MA FOA Cover Sheet content. The DAS ensures the FOA concept is consistent with ASEE priorities, the President's budget request, and/or Congressional direction. The following criteria may be considered, among other factors:

- Does the FOA support EERE or Technology Office goals?
- Is the FOA consistent with the submitted budget?

- Are there any obstacles to issuing the FOA?

Step 3: The DAS Chief of Staff schedules a briefing with ASEE on the FOA concept. Typically, the ASEE sets aside a few hours each month for FOA briefings.

BEST PRACTICE: Schedule a briefing time as soon as the FOA Manager begins drafting the MA FOA Cover Sheet. ASEE has limited schedule availability, so early scheduling minimizes the risk of schedule delays.

B. ASEE Briefing

Purpose: The FOA briefing to ASEE allows the FOA Manager and Technology Office Director to explain the FOA concept and the rationale for choosing the FOA topic(s). It equips ASEE with the information needed to justify the FOA during the review process.

Step 1: Prior to the meeting, the Technology Office Director determines the format of the briefing (i.e., whether to just walk through the document itself or bring a presentation to focus the conversation), and prepares his/her staff accordingly.

Step 2: During the meeting, the Technology Office Director and FOA Manager brief ASEE on the FOA and answer ASEE questions.

Step 3: At the end of the meeting, ASEE determines whether the FOA concept can be submitted to MA as-is, or whether the Technology Office must revise certain information. Additionally, ASEE directs the Technology Office on any follow-up actions (e.g., coordination with another DOE element).

Step 4: The FOA Manager revises the MA FOA Cover Sheet, if applicable.

Step 5: The Sector DAS Chief of Staff sends the final MA FOA Cover Sheet (and presentation, if used) to the designated representative in the Office of DAS-O, the CO, and Legal Counsel.

C. Submit FOA Concept to MA

Schedule Note: DOE approval or rejection of the FOA concept takes approximately 2 to 3 weeks from ASEE briefing date.

Step 1: The designated representative in the Office of DAS-O submits the MA FOA Cover Sheet to the MA FOA mailbox.

Step 2: MA coordinates the DOE review and approval process, including the ASEE briefing of the FOA concept to the DOE Review Team.

Step 3: DOE Review Team either approves or rejects the FOA concept. MA coordinates notification of decision to EERE.

- If rejected, the Technology Office cancels the FOA and redirects the funds for a different purpose.
- If approved without comments, the Technology Office continues with the FOA process.
- If approved with comments, the Technology Office incorporates the feedback and resubmits the MA FOA Cover Sheet to the Office of DAS-O.

D. DOE Approval

Step 1: MA notifies ASEE, ASEE Chief of Staff, and Office of DAS-O by email that the FOA has been approved.

Step 2: Office of DAS-O forwards the approval to the following people:

- Sector DAS and his/her Chief of Staff
- Technology Office Director
- Operations Supervisor
- FAO Director (GFO or NETL)
- EERE Communications POC

Step 3: The Operations Supervisor confirms the FOA is listed on the MA Work Plan spreadsheet, so that the Office of DAS-O may begin reporting the FOA's progress via the weekly MA Work Plan submission (see Section V.E below).

Step 4: The FOA Manager requests either the NOI sensitivity check (see Section VII.D NOI), or if the FOA is not utilizing an NOI, the FOA Manager requests the FOA green light (see Section VII.B Green Light to Publish FOA).

E. MA Work Plan

Purpose: The Technology Office inputs all DOE-approved FOAs into the MA Work Plan, which is used to report the progress of approved FOAs to MA on a weekly basis.

Step 1: On a weekly basis, the designated representative in the Office of DAS-O sends a reminder to Operations Supervisors to update the MA Work Plan spreadsheet with any new information.

Step 2: The Operations Supervisor updates the MA Work Plan spreadsheet with any new information (e.g., new planned dates, actual dates, etc.).

Step 3: The designated representative in the Office of DAS-O submits the updated Work Plan to MA on a weekly basis.

F. Major Changes to DOE-Approved FOAs

For FOAs that already have DOE approval, certain changes require additional consideration before the Technology Office can proceed with the change.

The following changes require a new submission to MA (proceed to Section V.A MA FOA Cover Sheet):

- Change to Overall FOA Concept
- TRL Increase

The following changes require ASEE approval, who will determine whether an updated submission to MA is required:

- Increase of $500,000 or more in DOE Funding
- TRL Decrease
- Alternate Selections

For any other changes, the Operations Supervisor simply updates the MA Work Plan (see Section V.E MA Work Plan, above).

G. Special Considerations for MA Cover Sheet (If Applicable)

i. Determination of Restricted Eligibility (DRE)

Standard Practice: The EERE standard eligibility language lists the entities eligible to apply for EERE FOAs (see Section III.A of the FOA Template).

Exceptions: The EERE standard eligibility language should not be modified except in the following circumstances:

- Where there is an approved Determination of Restricted Eligibility
- Where the statutory authority for the FOA includes specific eligibility language. In this instance, the statutory eligibility language replaces the standard EERE eligibility section of the FOA, and a DRE is not necessary.
- Where the FOA restricts FFRDCs or National Laboratories from applying as a prime or subrecipient due to an actual or appearance of a conflict of interest, a DRE is not required; however, the rationale for excluding the Lab(s) would need to be stated in the FRD. For example, it would be appropriate to restrict a Lab from applying to the FOA without a DRE where:
    - The Lab participated in the development of the FOA concept;

- The Technology Office intends to make a specific Lab available to selectees for technical assistance; or
- The Technology Office intends to have a Lab provide some form of project verification or review for the projects selected under the FOA.

Step 1: The FOA Manager discusses and finalizes a list of eligible entities with the Technology Office Director, DAS, CO, and Legal Counsel while drafting the MA FOA Cover Sheet (see Section V.A).

Step 2: The CO and Legal Counsel determine if a DRE is necessary for the proposed applicant pool for the FOA. If yes, proceed to Step 3.

Step 3: The FOA Manager prepares the draft DRE and supporting justification (see DRE Template).

Step 4: The GMS/CS, CO, and Legal Counsel review the DRE.

- The CO determines if additional reviews are necessary, based on the procurement review matrix[8].
- If necessary, the FOA Manager revises the DRE and re-routes for review.

Step 5: CONCURRENCE
Once edits from the GMS/CS, CO, and Legal Counsel are incorporated, the Technology Office Director, CO, Legal, and DAS concur by signing the DRE.

Step 6: APPROVAL
The FOA Manager sends the DRE to the approver for review, and incorporates any comments from that review. The DRE requires approval from one level above the Contracting Officer[9]. For GFO, the Financial Assistance Division Director approves the DRE. For NETL, the Procurement Director approves the DRE.

Step 7: Once the DRE is approved, the FOA Manager sends the signed document to the GMS/CS and incorporates the eligibility language into the draft FOA. DREs must be approved before the CO publishes restricted eligibility language in the FOA.

[8] This is an internal process specific to the Golden Field Office (see Review Matrix tab of the SWEET). NETL Contract Specialists shall follow the guidance related to this topic in the appropriate Best Practices Guide.
[9] See 2 CFR 910.126(b)(3) Competition

II. Cost Share Reduction and Waiver Determinations

Standard Practice: Section 988(b) of the Energy Policy Act of 2005 (EPACT 2005, Pub. L. 109-58, requires recipients to provide a specified percentage of cost share depending on the type of project (i.e., ≥50% demonstration, ≥20% research, 0% education/outreach).

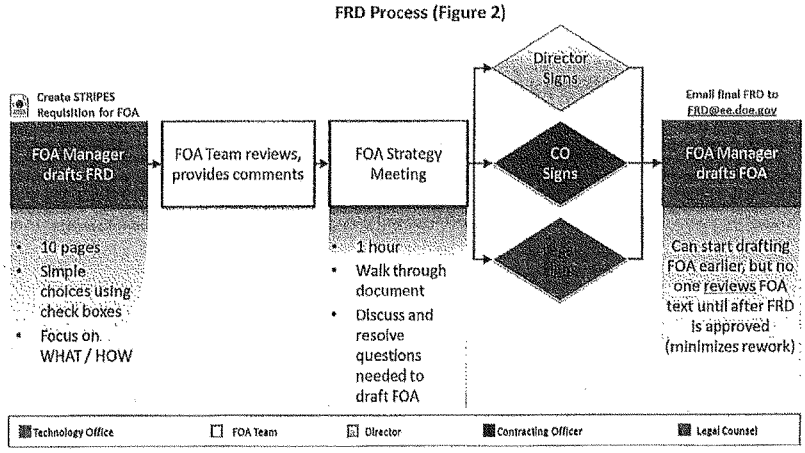
Exceptions:

- If available, apply the blanket EERE Cost Share Reduction Determination. The FOA Manager should check with Legal Counsel to determine if a current blanket EERE Cost Share Reduction Determination is in effect at the time of FOA development.
- Require cost share above the statutory minimums.
- Request a FOA-specific Cost Share Reduction Determination or FOA-specific Cost Share Waiver (see Cost Share Waiver/Reduction SOP)

VI. FRD Process

Purpose: The FOA Requirements Document (FRD) establishes approved parameters for FOA development, evaluation, and selection. The FRD review and approval process generates mutual understanding amongst all members of the FOA Team (see Section VI.A FOA Team) and the Technology Office Director as to how the FOA will be developed and executed. Once the FRD is concurred with and approved by all appropriate stakeholders, the FOA Manager adds the specific, approved decisions to the FOA template.

FRD Process (Figure 2)



A. FOA Team

The FOA Team includes the following:

- FOA Manager
- Co-FOA Manager, TPO, and/or support service contractors (as applicable)
- Contracting Officer (CO)
- Grants Management Specialist/Contract Specialist (GMS/CS)
- Legal Counsel
- IP Counsel
- NEPA Staff

Step 1: The Technology Office Director assigns the FOA Manager (see Section IV.C Annual FOA List) and may assign additional FOA Team members or delegate to the FOA Manager to assign additional FOA Team members.

Step 2: Upon receiving the MA FOA Cover Sheet (see Section V.A, MA FOA Cover Sheet), the Lead CO (or Branch Chief for GFO) assigns a CO and GMS/CS[10] to the FOA.

Step 3: The CO communicates all workload assignments to the FOA Manager.

Step 4: The FOA Manager ensures there is a current blanket COI/NDA form on file[11] for all FOA Team members (see Standard Evaluation and Selection Plan).

B. FOA Number Assigned

Purpose: EERE uses STRIPES, a DOE web-based information technology system, as the official FOA and award record. STRIPES is used to award and administer DOE acquisition and financial assistance instruments. The official FOA record in STRIPES contains all relevant documentation pertaining to the development, publication and modification of FOAs.

Step 1: The FOA Manager creates a requisition in STRIPES for the FOA (see the STRIPES User Guide).

Step 2: GMS/CS uses the requisition to create the STRIPES FOA Number (see the STRIPES User Guide).

[10] This role is the Grants Management Specialist (GMS) at the Golden Field Office and is the Contract Specialist (CS) at NETL.

[11] EERE employees and EERE support service contractors can complete a single blanket COI/NDA form that will apply to all evaluation and selection activities, across multiple FOAs.

Step 3: GMS/CS emails the FOA number to the FOA Manager and the CO for use on the FRD as well as future documentation.

Step 4: FOA Manger sends the STRIPES FOA number to the Operations Supervisor for use on the MA Work Plan spreadsheet.

Step 5: If the FOA is later cancelled (e.g., due to DOE rejection or otherwise), the GMS/CS cancels the FOA number in STRIPES, and the FOA Manager cancels the requisition.

C. Draft FRD

Schedule Note: FRDs must be approved by the end of October. For current year deadlines, refer to the latest FOA Memo or EERE Business Calendar.

The FOA Manager drafts the FRD using the FOA Requirements Document (FRD) template. Depending on what the FOA Manager selects in the FRD, more in-depth discussion and documentation may be necessary. Refer to the following sections of the SOP for more information:

- Determination of Restricted Eligibility (see Section V.G.i)
- Cost Share Reductions or Waivers (see Section V.G.ii)
- Selection Official Designation (see Evaluation and Selection SOP)
- Major changes to the EERE Standard Evaluation and Selection Plan (see Evaluation and Selection SOP)
- Property[12]

Through Section II.B of the FRD, the Technology Office documents the planned evaluation and selection process for the FOA, including selecting options where applicable, and obtains the necessary concurrences and approvals. For further information on the evaluation and selection process, and how to complete this section of the FRD, refer to the Evaluation and Selection SOP.

D. FOA Strategy Meeting

Purpose: To involve all members of the FOA Team (see Section VI.A FOA Team) in making key decisions relevant to the entire FOA process. It is an opportunity for the FOA Team to collaboratively develop the FRD by providing expert advice and counsel in their subject matter areas.

[12] If you expect large equipment purchases on the FOA awards or if the FOA is for large, demonstration-scale projects, the best practice is to discuss a strategy for property disposition at the FRD stage.

Format: The FOA Strategy Meeting should be a single meeting. FOA Team members should participate in the FOA Strategy Meeting in-person or via teleconference if in another duty location.

Step 1: BEFORE THE MEETING
The FOA Manager schedules a FOA Strategy Meeting with the entire FOA Team.

Step 2: The FOA Manager distributes the approved MA FOA Cover Sheet and draft FRD to the FOA Team for review ***at least 3 business days*** before the meeting.

Step 3: The FOA Team reviews the FRD and comes to the meeting prepared to discuss their comments.

BEST PRACTICE: FOA Team members send red-lined comments to FOA Manager prior to the meeting. FOA Manager consolidates all comments into one document for use at the meeting[13].

Step 4: DURING THE MEETING
The FOA Manager presents the FRD to the FOA Team and seeks feedback. The discussion should focus on the rationale for and the proposed implementation of each approach selected. The meeting objectives are to:

- Ensure the FOA Team has a complete understanding of the FOA and critical elements of the FRD
- Ensure the CO, GMS/CS, and Legal Counsel have a complete understanding of how the evaluation and selection process will be conducted, particularly if there are any changes to the standard EERE Evaluation and Selection Plan (see Evaluation and Selection SOP)
- Allow Legal Counsel to determine if a new Selection Official designation is needed and review any non-standard approaches (see Evaluation and Selection SOP)
- Allow IP Counsel to develop an IP Strategy for the FOA
- Allow NEPA staff to develop a NEPA Strategy for the FOA
- Establish agreement and commitment of all team members to complete all FOA activities in accordance with the FOA schedule, as described in Section VI of the approved FRD

E. FRD Approval

Step 1: The FOA Manager resolves all FOA Team comments and incorporates any

[13] To combine comments from multiple documents automatically in Word, select the "Review" menu in the ribbon, click the "Compare" drop down button and select "Combine".

agreed upon outcomes and decisions from the FOA Strategy Meeting into a clean copy of the FRD for the Technology Office Director, CO, and Legal Counsel to sign. The FOA Manager must address all CO and Legal Counsel comments and edits prior to sending the FRD to the Technology Office Director for approval. Once the FOA Manager receives confirmation from the CO and Legal that their comments have been addressed, proceed to Step 2.

Step 2: TECHNOLOGY OFFICE DIRECTOR REVIEW
The FOA Manager meets with the Technology Office Director to discuss the FRD. If the FRD is modified as a result of the Technology Office Director's review, the FOA Manager must consult with the CO and Legal Counsel on the changes before the Technology Office Director signs the FRD.

Step 3: TECHNOLOGY OFFICE DIRECTOR APPROVAL
The Technology Office Director approves the FRD after any necessary changes are incorporated.

Step 4: CO & LEGAL CONCURRENCE
CO and Legal sign the FRD to indicate final concurrence.

Step 5: The FOA Manager sends the MA FOA Cover Sheet and signed FRD to the following:

- CO
- GMS/CS
- Legal Counsel
- Technology Office Communications Lead

F. FRD Modifications (IF APPLICABLE)

If the FOA Manager contemplates changing an aspect of the FOA or Evaluation and Selection approach after the FRD has been signed, he/she should consult the FRD Modification Template to determine the appropriate course of action.

If an FRD Modification is required, the FOA Manager sends the final, approved FRD Modification to the following people:

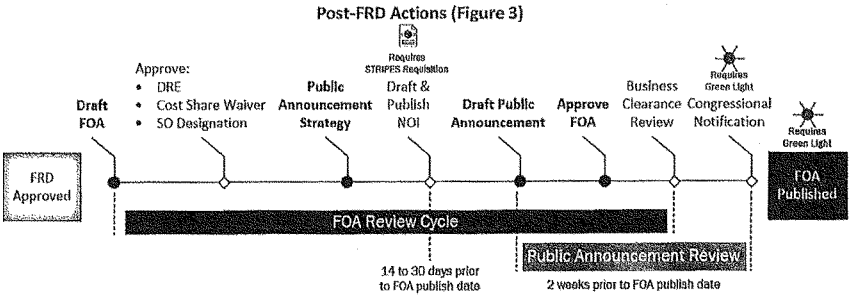
- CO
- GMS/CS
- Legal Counsel

VII. FOA Process

Schedule Note: FOAs must be ready for publication no later than mid-December. For the current year deadlines, refer to the latest FOA Memo or EERE Business Calendar.

All the actions in Figure 3 (below) can take place concurrently with the FOA review cycle (see Section VII.F FOA Review & Approval) and Public Announcement review cycle (see Section VII.E Public Announcement Review & Approval), but must be completed prior to FOA publication.

Post-FRD Actions (Figure 3)



Actions shown in grey text in Figure 3 above are only applicable to some FOAs. See the relevant sections below to determine applicability:

Action	Required If...	More Details
Determination of Restricted Eligibility	Approved in FRD	Section V.G.i
FOA-Specific Cost Share Reduction or Waiver Determination	Approved in FRD	Section V.G.ii
New Selection Official Designation	Approved in FRD	Evaluation and Selection SOP
Notice of Intent	Approved in FRD	Section VII.D
Business Clearance Review	Selected by Business Clearance	Section VII.G
Congressional Notification	FOA $\geq$ \$50M (DOE + Cost Share)	Section VIII.A

A. FOA Drafting

The FOA Manager prepares the FOA using the FOA Template. Information and decisions in the approved MA FOA Cover Sheet and FRD are used to create the FOA. The FOA Manager should follow all instructional text in the FOA Template. Because the template follows the OMB-required format for FOAs, the template cannot be altered without input and concurrence from CO and Legal Counsel in order to ensure that proposed changes do not conflict with OMB requirements.

The final FOA will be reviewed by the Technology Office Director for conformance to the MA FOA Cover Sheet and FRD before publication (see Section VII.F FOA Review & Approval).

B. Plan Public Announcement Strategy

Schedule Note: The FOA Manager must discuss the proposed FOA Announcement Strategy with the Technology Office Communications Lead six to eight weeks prior to the planned FOA publication date.

Step 1: The FOA Manager discusses the following topics with the Technology Office Communications Lead:

- Public Announcement Strategy[14] (see Figure 4 below)
- Congressional and Stakeholder Engagement Approach
- Timing of NOI Publication (if approved in the FRD)
- Timing of FOA Publication

Public Announcement Strategies (Figure 4)

Stakeholder Email Blast	EERE Progress Alert	DOE Press Release
• Default for NOIs[15] • Distributed to a targeted email list by the Tech Office Comms Lead • For FOAs, can opt to send *in addition to* Progress Alert or Press Release	• Default for FOAs up to $10M DOE Share • Distributed to an email list of 70,000+ general stakeholders and reporters in government and the clean energy industry • Posted on EERE website by EERE Comms	• Default for FOAs > $10M DOE Share • Distributed to hundreds of reporters nationwide and to EERE's Progress Alert email subscribers • Posted by DOE Public Affairs

Step 2: The Technology Office Communications Lead adds the FOA (and NOI, if applicable) to the Policy Calendar. For more information on the Communications process, refer to Public Announcement Approval Process.

[14] Note: No public announcement will be made if the subject matter is sensitive or otherwise does not require an announcement. The most common reason not to publicly announce a FOA would be due to political or internal sensitivity at the time the FOA is published.

[15] Stakeholder email blasts are also the default for RFIs.

C. FOA Mailbox

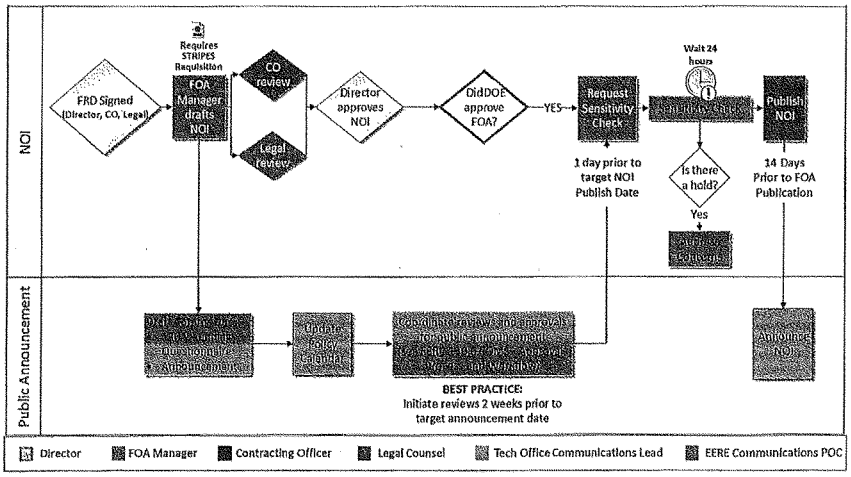
All applicant questions are received in the FOA mailbox once the FOA is published. The GMS/CS is responsible for creating the FOA Mailbox and sending the email address to the FOA Manager to include in the FOA document. Refer to FOA Q&A Process for detailed instructions[16].

D. Notice of Intent (NOI)[17]

Schedule Note: NOI publication should occur at least 14 calendar days prior to FOA publication; however, it is a best practice to publish an NOI 30 calendar days prior to FOA publication.

Purpose: The NOI notifies the public and stakeholders of the Technology Office's intention to publish a new FOA. This notification serves to heighten public awareness of the upcoming FOA, which allows potential applicants additional time to assemble project teams and prepare for applying. An NOI is highly encouraged, but not required. The content of the NOI should be cut and pasted from the draft FOA.

NOI Process (Figure 5)



[16] This document is GFO-specific. For NETL, refer to internal procedures.

[17] Note: RFIs follow the same public announcement approval process as NOIs, however, RFIs take place earlier in the FOA process (see Section IV.A Initial FOA Planning).

Step 1: Once the FRD is approved, the FOA Manager drafts the NOI using the Notice of Intent (NOI) Template.

Step 2: The FOA Manager (or his/her delegate) initiates a requisition in STRIPES for the NOI (see STRIPES User Guide).

Step 3: The GMS/CS creates an NOI number in STRIPES (see STRIPES User Guide).

Step 4: The FOA Manager sends the draft NOI to the Technology Office Director, CO, GMS/CS and Legal Counsel for review and comment.

- The GMS/CS, CO, and Legal Counsel review.
- The CO determines if additional reviews are necessary based on the local procurement review matrix[18].

Step 5: While the draft NOI is in review, the FOA Manager coordinates with the Technology Office Communication Lead to draft and obtain approval for the NOI public announcement (typically a stakeholder email blast). See Approval Process Workflow and Review Levels for details.

Step 6: The FOA Manager incorporates any comments and edits from Step 4 into the draft NOI.

Step 7: **APPROVAL**

The Technology Office Director reviews the final NOI for publication.

- If the NOI is not approved for publication, the FOA Manager revises the NOI based on the Director's comments and re-submits it for Director's approval a second time.
- Any changes made as the result of the Technology Office Director's review also need CO and Legal concurrence.

STOP Wait for DOE Approval of the FOA before proceeding to the next step STOP

Step 8: At least 1 business day prior to publication, the FOA Manager, in coordination with the Technology Office Communications Lead and the EERE Communications POC, requests the sensitivity check[19] for the NOI.

[18] This is an internal process specific to the Golden Field Office (see the Review Matrix tab of the SWEET). NETL Contract Specialists shall follow the guidance related to this topic in the appropriate Best Practices Guide.

[19] No explicit green light approval is required for NOIs, however, if a hold is requested during the 24 hour waiting period, the hold continues indefinitely until the holding office explicitly approves the publication of the NOI.

Wait 24 hours before proceeding to the next step

Step 9: If no holds are requested in Step 8, proceed to the Step 10. If a hold is requested, the FOA Manager contacts the EERE Communications POC to discuss ways to address the concern.

Step 10: The FOA Manager emails the GMS/CS and CO indicating the waiting period has expired and to proceed with publishing the NOI.

Step 11: To publish the NOI, the GMS/CS enters the NOI into STRIPES and into the Exchange system and routes the NOI to the CO for approval (see STRIPES User Guide and Exchange User Guide[20] for instructions).

Step 12: The CO approves the NOI in STRIPES and publishes the NOI in the Exchange system.

Step 13: The GMS/CS publishes the NOI Synopsis to Grants.gov via STRIPES and notifies the FOA Manager that the NOI has been published.

Step 14: The FOA Manager informs the Technology Office's Communications Lead that the NOI has been published and stakeholders should be notified.

E. Public Announcement Review & Approval

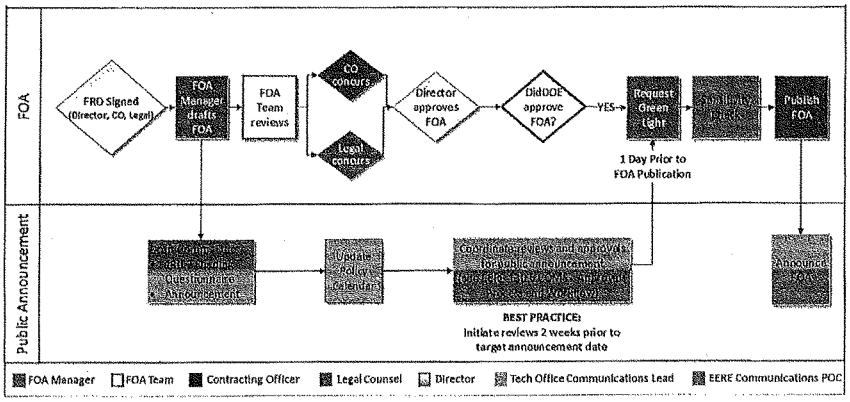
Purpose: A public announcement of the FOA both increases awareness of the FOA for potential applicants and provides an opportunity to persuade average Americans to care about a particular initiative. Because the announcement is public-facing, EERE must:

- Coordinate the FOA announcement into DOE's overall communication strategy and messaging.
- Ensure awareness and coordination across various DOE offices (including CI, CF, and PA) via sensitivity checks prior to going public.

The public announcement review and approval process takes place concurrently with the FOA review and approval process (see Figure 6 below).

[20] Please note, you must log in to the Exchange systems to view user guides for EERE employees.

FOA Public Announcement Process (Figure 6)



Step 1: The Technology Office Communications Lead begins writing the communications materials (press release, progress alert, or stakeholder email). For assistance, see Tips for Writing Public Announcements.

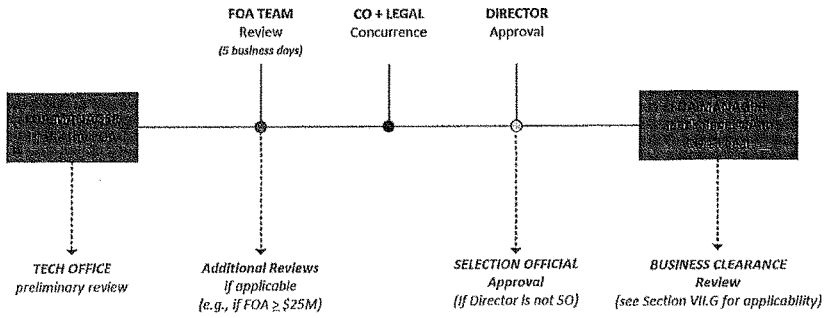
Step 2: The Technology Office Communications Lead updates the FOA details on the policy calendar.

Step 3: At least 2 weeks before the target FOA Announcement release date, the Technology Office's Communications Lead initiates the public announcement review process. For details, see Public Announcement Approval Process.

F. FOA Review & Approval

Purpose: The FOA review process supports quality control, compliance, and data verification of the final FOA. Special emphasis is placed on ensuring that the FOA conforms to the approved FOA template as well as the approved MA Cover Sheet and FRD. Successive reviews by senior management are prescribed for FOAs above specified dollar thresholds per the local procurement review matrix. The FOA Manager is responsible for drafting the FOA and obtaining the required reviews and approvals.

FOA Review and Approval Process (Figure 7)



Step 1: After drafting the FOA (see Section VII.A), the FOA Manager coordinates any preliminary internal Technology Office reviews. This varies by Technology Office, so consult the Technology Office Director for specific requirements.

Step 2: If anything in the FOA does not reflect the decisions approved in the final MA Cover Sheet and FRD, the FOA Manager follows the guidance in Section VII of the FRD to determine what actions are necessary.

Step 3: The FOA Manager sends the draft FOA to the FOA Team, providing a ***minimum of five business days*** for review and comments.

Step 4: The CO will determine if additional reviews outside of the standard reviews are required based on the local procurement review matrix and coordinate those reviews[21].

Step 5: The FOA Team reviews the draft FOA and provides feedback to the FOA Manager.

Step 6: The FOA Manager revises the FOA, maintaining a record of all comments and how they were addressed or resolved.

Step 7: After all comments are resolved, the FOA Manager sends the final draft FOA to CO and Legal.

[21] This is an internal process specific to the Golden Field Office (see the Review Matrix tab of the SWEET). NETL Contract Specialists shall follow the guidance related to this topic in the appropriate Best Practices Guide.

Step 8: CONCURRENCE
The CO and Legal Counsel review the final draft FOA and provide concurrence.

Step 9: If the Technology Office's internal policies require any additional reviews/concurrences on the program side prior to the Technology Office Director's review, the FOA Manager obtains those at this time. If anything changes due to these reviews, the FOA Manager re-sends the FOA to CO and Legal Counsel for final concurrence.

Step 10: The FOA Manager collects the final versions of the FOA Package (contents listed below) and sends the FOA Package to the Technology Office Director for review and approval.

FOA Package contents:

- Approved MA FOA Cover Sheet and FRD
- Final draft FOA concurred on by CO and Legal
- If applicable, also include:
  - Approved Determination of Restricted Eligibility (DRE) (see Section V.G.i)
  - Approved Cost Share Reduction or Waiver Determination (see Section V.G.ii)
  - Signed FRD Modification (see Section VI.F)

Step 11: APPROVAL
The Technology Office Director reviews the FOA Package. If the Director is not the Selection Official, the FOA Manager must also send the FOA to the Selection Official for approval.

- If the FOA conforms to the approved MA FOA Cover Sheet and FRD, the Technology Office Director approves the FOA and the FOA Manager can proceed to Step 12 below.
- If the FOA does not conform to the approved MA FOA Cover Sheet and FRD, the FOA Manager follows the guidance in Section VII of the FRD to determine if an FRD modification is necessary.

Step 12: FOA Manager sends the final FOA to the CO and Legal Counsel.

BEST PRACTICE: FOA Manager sends both the clean copy of the FOA and a red-lined version that specifically highlights what changes (if any) were made to the FOA since the CO and Legal Counsel last concurred.

Step 13: If Business Clearance elected to review the FOA (see Section IV.D Business Clearance Review Initiated), the CO coordinates the review of the final draft FOA, through the HCA and Office of Management's Field Assistance &

Oversight Division (MA-621) for Business Clearance review. Additional time must be allocated to accommodate the review and incorporation of any Business Clearance comments and edits provided after Business Clearance review. See Section VII.G below for additional detail on when this might be necessary.

G. DOE Business Clearance Review (If Applicable)

Applicability: At the beginning of the FOA season, a subset of FOAs from the EERE Annual FOA List is sent to Business Clearance (see Section IV.D Business Clearance Review Initiated). From that subset, Business Clearance identifies the EERE FOAs they plan to review. If the FOA was not originally intended to be $50M or greater, or if the FOA was added to the EERE Annual FOA List after the subset of FOAs was offered to Business Clearance, the CO offers the FOA to Business Clearance at this time. For the complete Business Clearance process, see Chapter 71 of the current DOE Acquisition Guide.

Timing: Business clearance review will take at least ten business days. Business Clearance will only review the final draft FOA.

Step 1: The GMS/CS drafts the Transmittal Memo for Business Clearance. In addition to the Memo, the Business Clearance Submission package should include the following information:

- Final draft FOA
- Evidence of reviews and approvals from all required reviewers, including all comments and resolution of comments
- Any applicable supporting documents (e.g., DRE, Cost Share Waiver, etc.)

Step 2: The GMS/CS coordinates all reviews of the Memo and the Business Clearance Submission package according to the local procurement review matrix[22]. As part of the review, the CO ensures all necessary reviews have been completed for the supporting documents (e.g., legal review for FOA).

Step 3: The CO coordinates submission of the final package to Business Clearance.

Step 4: Within ten business days, Business Clearance informs the CO if the FOA is "approved," "not approved," or "conditionally approved" and if it needs to be re-submitted for subsequent Business Clearance review after revisions are made.

[22] Golden Field Office GMSs, see the Review Matrix tab of the SWEET). NETL Contract Specialists shall follow the guidance related to this topic in the appropriate Best Practices Guide.

Step 5: The CO distributes the comments to the GMS/CS, Legal Counsel, and the FOA Manager.

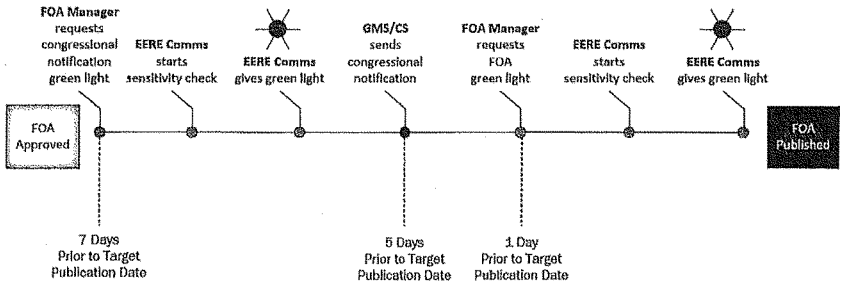
- "Mandatory" comments must be corrected by the GMS/CS, CO, Legal Counsel and the FOA Manager prior to FOA publication.
- "Highly Recommended," "Clarification," "Suggestion", and "Editorial" comments are reviewed by the GMS/CS, CO, Legal Counsel and the FOA Manager and are incorporated where appropriate.

VIII. FOA Publication

A. Congressional Notifications (If Applicable)

Purpose: FOAs over $50 million (DOE Share + Cost Share) require a 72 hour (3 full business days) Congressional Notification (DOE F 541) prior to FOA publication. See Chapter 5.1 of the current DOE Acquisition Guide, "Congressional Notification" and Chapter 2 of the current DOE Guide to Financial Assistance.

Green Light for Congressional Notifications (Figure 8)



Step 1: The FOA Manager confirms that DOE Approval for the FOA concept has been received (see Section V.D DOE Approval) and the Public Announcement for the FOA has been approved (see Section VII.E Public Announcement Review & Approval).

Step 2: The FOA Manager emails the EERE Communications POC to request the Congressional Notification green light. This should occur at least 7 days before the target FOA Announcement publication date.

Step 3: The EERE Communications POC performs the sensitivity check (see Public Announcement Approval Process for details) and emails the Green Light to the FOA

Manager to send congressional notifications.

Step 4: The FOA Manager forwards the green light email to the CO and GMS/CS.

Step 5: GMS/CS sends a completed DOE F 541: CI Solicitation Notification form to CI.Notification@hq.doe.gov with the subject line: "ACTION: CI Solicitation Notification."

B. Green Light to Publish FOA

Timing:

- The FOA Manager initiates the FOA Announcement Green Light Process at least one business day before the FOA is scheduled to be published (see Figure 8).
- If congressional notifications WERE required (see Section VIII.A Congressional Notifications), wait to request the FOA green light until 24 hours before the congressional notification waiting period is scheduled to expire.
- If congressional notification WERE NOT required, prior to requesting the green light the FOA Manager must confirm that DOE Approval for the FOA concept has been received (see Section V.D DOE Approval) and the Public Announcement for the FOA has been approved (see Section VII.E Public Announcement Review & Approval).

Step 1: The FOA Manager emails the EERE Communications POC to request the green light and confirms that the FOA is ready to publish.

Step 2: The EERE Communications POC performs the sensitivity check and emails the green light to the FOA Manager to post the FOA. For details, see Public Announcement Approval Process.

Step 3: The FOA Manager forwards the Green Light email from the EERE Communications POC to the CO and GMS/CS.

C. Publish FOA

Step 1: The GMS/CS enters the FOA into STRIPES and into EERE Exchange and routes the FOA to the CO for review and approval (see STRIPES User Guide and Exchange User Guide[23] for instructions).

Step 2: **APPROVAL**
The CO publishes the FOA in STRIPES and in EERE Exchange.

[23] Please note, you must log in to the Exchange systems to view user guides for EERE employees.

Step 3: The GMS/CS publishes the FOA Synopsis to Grants.gov via STRIPES (see STRIPES User Guide for instructions)

Step 4: The GMS/CS sends the live EERE Exchange link to the FOA Manager, who forwards it to the Technology Office Communication Lead.

Step 5: The Technology Office Communications Lead publishes the FOA synopsis on the Technology Office's website. If a public announcement is planned for the FOA, the EERE Communications POC ensures the publication of the announcement. For details, see Public Announcement Approval Process.

IX. Post-FOA Publication

A. FOA Webinar (Optional)

Purpose: A FOA webinar provides potential applicants with an overview of the FOA objectives, the applicant submission process, and the evaluation and selection process.

Step 1: The FOA Manager prepares the FOA Webinar slide deck using the FOA Webinar Template.

Step 2: CO and Legal Counsel review the tailored FOA Webinar slide deck before it is finalized and used.

Step 3: The FOA Manager sets up a webinar format that can be recorded (e.g., WebEx, GoToMeeting, etc.) and invites the CO, GMS/CS, and Legal Counsel to participate in the webinar.

Step 4: In order to meet the requirements of the Section 508 Amendment to the U.S. Rehabilitation Act[24], the FOA Manager emails DL-EEREActioNetWebTeam@Hq.Doe.Gov to request a transcription service, copying the Technology Office's Technical Monitor. The request must include:

- Anticipated length of the webinar
- Title of the webinar
- Deliverables, i.e., a transcript and text alternative that includes the following information so that someone could read the transcript and understand everything that occurred during the webinar:
    - All spoken dialogue (except ums and ahs)

[24] Requires Federal agencies to make their electronic and information technology accessible to people with disabilities.

- Description of all important events and actions that occurred during the webinar
- Description of anything visually displayed during the webinar

Step 5: The FOA Manager leads the webinar. Live Q&A can take place during the webinar; however the FOA Manager cannot express opinions or ideas not included in the FOA.

BEST PRACTICE: The FOA Manager should ensure the webinar recording has good audio quality. It is important that all speech is audible, otherwise, the transcript will cost more.

Step 6: The FOA Manager sends the recording of the webinar and the slides to DL-EEREActioNetWebTeam@Hq.Doe.Gov, who creates a Section 508-compliant transcript and sends it to the FOA Manager to forward to the GMS/CS[25].

Step 7: The GMS/CS posts a link to the webinar recording, Section 508-compliant transcript, and any Q&A to Exchange. This ensures all potential applicants receive the same information.

Step 8: Additional webinars are optional and are conducted at the Technology Office's discretion.

B. FOA Q&A

Purpose: The FOA Q&A process:

- Ensures all applicants have access to the same information about the FOA.
- Prevents the appearance of competitive advantage or applicant "coaching" that could arise from DOE communicating with applicants one-on-one.

For GFO, the details of the FOA Q&A process are explained in FOA Q&A Process. For NETL, the CS posts all questions and answers to the respective FAQs webpage in the Exchange system.

If DOE/EERE employees or contractors receive a question outside of the FOA Q&A process (e.g., by phone or to a non-FOA Mailbox email), the person receiving the question should:

1. Immediately notify the FOA Manager and the Contracting Officer.
2. Direct the person asking the question to Exchange and explain that for fairness purposes, all questions must go through the public process.

[25] This should take approximately one week, however, if multiple offices request a webinar transcript at the same time, it could take longer. Similarly, if the Technology Office does not have sufficient funds on the web services contract, new funds would need to be added, which could take six weeks or more.

C. FOA Modifications (If Applicable)

Purpose: After the FOA is published, modifications may be needed based on the needs of the Technology Office or as a result of questions submitted during the Q&A period. For example, if there are many questions requesting clarification of a certain section or a technical requirement, the FOA Manager may see the need to clarify that section of the FOA by publishing a modification for the public to view.

The FOA Manager is responsible for initiating all modifications to the FOA and obtaining the necessary reviews and approvals.

Step 1: The FOA Manager revises the FOA document, noting changes on the modifications table (copy from the FOA Template and paste into the modified FOA).

Step 2: If the FOA is within 30 days of closing, the CO and FOA Manager, in consultation with Legal Counsel, should consider whether the modification is significant enough to extend the FOA close date.

Step 3: The FOA Manager discusses the FOA modification with the Technology Office Director (and the Selection Official, if different from Technology Office Director).

Step 4: The FOA Manager sends a red-lined copy of the FOA modification to the GMS/CS and CO for review.

- The CO determines if additional reviews are necessary, based on the local procurement review matrix[26].
- Depending on the scope of the modification, the CO will determine if Legal Counsel concurrence is necessary, however, Legal will always receive notice that the FOA is being modified (see Step 8 below).

Step 5: The GMS/CS enters the FOA modification into STRIPES and into the Exchange system and routes the FOA modification to the CO for approval (see STRIPES User Guides and Exchange User Guides[27] for instructions).

Step 6: The CO publishes the FOA modification in STRIPES and in the Exchange system.

Step 7: The GMS/CS publishes the FOA modification Synopsis to Grants.gov via STRIPES.

[26] Golden Field Office GMSs, see the Review Matrix tab of the SWEET). NETL Contract Specialists shall follow the guidance related to this topic in the appropriate Best Practices Guide.
[27] Please note, you must log in to the Exchange systems to view user guides for EERE employees.

Step 8: The GMS/CS notifies the FOA Team, Technology Office Director, and Selection Official (if different from the Technology Office Director) once the FOA modification is approved.

This concludes the FOA Development Phase. For guidance on what comes next, see the Evaluation and Selection SOP. For questions, contact PMHelpDesk@ee.doe.gov.

FOA Development Standard Operating Procedure
EERE S 540.110
Issued on August 31, 2018

Signature

Bindu Jacob
Acting Director, Project Management Coordination Office
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Attachment 5

EE4S Gay FOIA Certification

FREEDOM OF INFORMATION ACT SEARCH CERTIFICATION FORM
(PLEASE COMPLETE CERTIFICATION SECTION BELOW)

DATE: November 5, 2018

TO: Tia Alexader/EE

FROM: Stephanie Ostrowski/MA-46

RE: REQUEST NUMBER: HQ-2018-01594-F

DESCRIPTION OF RECORDS REQUESTED:

2. All correspondence, including any attachments, regarding Acting Assistant Secretary Tripodi's use of the terms "political", "midterms", or "geographic diversity", sent to or from the Covered Individuals.

The time period for this request is March 23, 2018, to the date the search is conducted.

Requested Responsive Document Format Type: Electronic	**Responsible Program Office: EE**
FOIA Response Due Date: November 13, 2018	**Requester Willing to Pay $:Fee Waiver**

The attached request has been referred to your office to conduct a search for responsive records. Please return this certification and any responsive records.

SCOPE OF SEARCH & SEARCH PARAMETERS

☐ **Requested information not under _____ jurisdiction; refer/reassign to: _____.**
☐ **Requested information may also be found: _____.**
☒ **Responsive documents exist and retrieval will not exceed agreed upon fees (see above amount).**
☐ **Responsive documents exist and retrieval will exceed agreed upon fees.**
(Prior to search contact DOE FOIA Specialist to discuss projected charges)
☐ **Responsive documents will be numerous and will take a significant amount of time to complete.**
(Prior to search contact the requester to try and narrow the scope of request and/or notify them of an approximate completion time. DOE FOIA Specialist must be notified of results of discussion)

Date(s) of Search: 8 November 2018

Name: CHARLES F. GAY Hourly Rate: N/A Search Time: 3 HOURS	Name: Hourly Rate: Search Time:	Name: Hourly Rate: Search Time:

Type of Search	List Files/Areas Searched (physical and electronic)	Dates/Keywords/Other Criteria Used in Search
☒ Manual ☐ Automated ☐ Other	☒ C.GAY staff records ☒ C.GAY email accounts ☐ Employee self-searched ☐ CIO Group Search ☐ x Archived e-mail accounts ☐ Archived onsite records holdings ☐ Archived offsite records holdings ☐ eDOCS records ☐ Other records	23 MARCH - 8 NOVEMBER 2018 KEY WORDS: POLITICAL, MIDTERMS GEOGRAPHIC DIVERSITY

SEARCH FINDINGS

☐ We have been unable to locate any documents/records responsive to this request.

☒ We have located ALL unclassified documents that are responsive to this request.

☒ The responsive documents fall within the scope of and time frame of the request.

☒ We have located 0 responsive audio / video records.

☐ Responsive records have been sent to NARA under File Name/Number_____

☐ The records/_____some records located contain classified and have been referred for review to the Office of Classification (memo attached)

☒ Total number of unclassified documents that have been identified 52 NET OF THIS MEMO

RECOMMENDATIONS/OTHER

☐ Documents should be released in their entirety.

☒ Please advise of any sensitivities/issues the FOIA Office should be aware of regarding these documents and should note for possible redaction/withholding (e.g., drafts, confidential business information, or privacy information).

SELECTEES SHOULD BE REDACTED IN 14a, 15a, 16a, 17a, 20a, 26a, 28a, 31a, 34a

☐ Recommendations if any of other offices that need to concur/review response before issuance: _____.

NO Has your office had any communications with the requester regarding scope/clarification? If so, please attach records of your communications.

MS

SUBJECT MATTER EXPERT CONCURRENCE

Name and extension of Subject Matter Expert should the FOIA Office have additional questions:

CHARLES F. GAY — Name

202-287-1987 — Phone number

I CERTIFY BY SIGNATURE BELOW THAT A THOROUGH SEARCH HAS BEEN CONDUCTED FOR RECORDS/INFORMATION RESPONSIVE TO THIS REQUEST AND ALL RESPONSIVE MATERIAL HAS BEEN BROUGHT TO THE ATTENTION OF THE FOIA GROUP.

Charles F. Gay — SIGNATURE (Federal Employee)

8 November 2018 — (DATE)

CHARLES F. GAY DIRECTOR, SOLAR ENERGY TECHNOLOGIES OFFICE U.S. DEPARTMENT OF ENERGY — PRINTED NAME AND TITLE

SPECIAL INSTRUCTIONS

1. All responsive records are to be provided to the FOIA Office in paper and on CD. The scanned version should mirror the paper copy.

2. When the package is ready for the FOIA Office, please contact the FOIA contractor assigned to your office to schedule a time for pick-up and overview. (At this time, you may want to have the SME available to answer questions that may arise)

3. If you have any questions about the request in general, prior to or during the search, please contact the FOIA Analyst assigned to the case.

CFG

Charles F. Gay - Biography

Dr. Charlie Gay is a subject matter expert in renewable energy technologies with over 45 years of experience. Currently, he serves on the Sandia National Laboratory Energy and Homeland Security External Advisory Board. He retired in November 2019 from his position as Director of the DOE Solar Energy Technologies Office, which he led from 2016–2019. In the mid-1990s he served as Director of the National Renewable Energy Laboratory (NREL).

Dr. Gay has extensive private-sector experience, including past tenures as president of applied solar for Applied Materials, chairman of the technology advisory board for SunPower Corp, president and chief executive officer of ASE Americas, managing director and co-founder of UNISUN, president and chief operating officer of Siemens Solar Industries, and president of ARCO Solar. At ARCO Solar he built the world's first commercial-scale photovoltaics (PV) manufacturing factory in 1979. He was also part of the team to build the world's first substation-tied electric utility PV power plant. This 1megawatt installation was more than 100 times larger than any prior grid-connected PV plant. Dr. Gay is also creator of the Greenstar Foundation, an organization that delivers solar power with internet access to villages in the developing world. And he has advised and continues to advise many renewable energy startup companies. Dr. Gay has a Ph.D. in physical chemistry from the University of California, Riverside. He holds numerous patents for solar cell and photovoltaic module construction, won the Gold Medal for Achievement from the World Renewable Energy Congress, and was elected to the U.S. National Academy of Engineering in 2013.

Chairman FOSTER. The Chair will now recognize Mr. Reardon for his testimony.

TESTIMONY OF MR. ANTHONY M. REARDON,
NATIONAL PRESIDENT,
NATIONAL TREASURY EMPLOYEES UNION

Mr. REARDON. Thank you, Chairman Foster, Ranking Member Weber, and distinguished Members of the Subcommittee. I appreciate the opportunity to be here today.

As the National President of NTEU, I have the honor of leading a union that represents 150,000 Federal employees at 33 agencies, including employees at DOE and its Office of Energy Efficiency and Renewable Energy. EERE is a leader in the transition to a global clean energy economy and a prosperous United States powered by clean, affordable, and secure energy. The employees at EERE are committed to the principle that government-funded research is necessary to foster innovative ideas that aren't yet viable in the private sector.

According to the Energy Department's own statistics, the $20 billion in taxpayer investment in EERE over the last 12 years has yielded a net economic benefit to our country of $230 billion. However, despite its clear economic benefits, the Administration's budget request for the past 3 years have called for at least a 70 percent reduction in funding to EERE. Budget cuts of this size would cripple the mission of EERE, undercut its work and its economic impact, and would require the agency to lay off much of the workforce.

Unsurprisingly, the proposed budget cuts created a morale crisis for the employees at EERE. The scientists, mathematicians, and engineers who work there could be earning much larger paychecks elsewhere but chose a career in civil service out of a desire to serve their country. Former EERE employees with immense knowledge and expertise have told us they retired earlier than originally planned because of declining morale. Midcareer employees have taken other positions either within DOE or outside the Department where they tell us they feel much more valued and their talent and skill more valued.

Despite Congress' rejection of the proposed budget cuts, EERE is still significantly understaffed. Due to several issues, including hiring failures by management and poor employee relations, EERE is currently operating with only 553 FTEs, down from 710 in January of 2017. As a result, important work is left undone or employees are overburdened, making EERE an even less attractive place to work as it seeks to fill positions.

In addition, the lack of adequate staffing has resulted in fewer site visits to monitor projects funded by EERE and ensure that they are on track. I'm sure Members of the Science Oversight Subcommittee and other Members here today understand how important project oversight is.

Further, there have been at least 20 employees transferred out of EERE, and at least some of these transfers were not performed in accordance with the collective bargaining agreement currently in place. Employees have told us that they were dismayed at the lack of process and explanation.

Employees have also reported that there is a strong perception that EERE management does not value longer-tenured employees and seems to encourage eligible employees to retire rather than stay with EERE. Our union stewards there have told me grievances and EEO (Equal Employment Opportunity) complaints are now more frequent and more egregious.

While the 2017 hiring freeze guidance was lifted, many stringent and hampering conditions and approvals still seem to be standing in the way of hiring at EERE. It is our understanding that the Department of Energy human resources has had vacant positions pending classification and next steps in the hiring process since the summer of 2019. We understand the agency plans to hire at least 80—we heard today 70 FTEs—but so far, we've seen no evidence that they've been taking the steps needed to fill these positions.

In addition to the challenges within EERE, the past few years have been a trying time for all civil servants who work hard every day for the American people. Federal employees have faced government shutdowns and threats of shutdowns. They've been subjected to unnecessary forced relocations and proposed agency closures. They've been disparaged by government leaders who refer to them as bureaucrats and swamp creatures.

Federal employees have faced pay freezes, hiring freezes, threatened cuts to employee benefits, elimination of key work-life balance benefits such as telework, and ongoing efforts to roll back employee collective bargaining and due process rights and protections. This creates a constant state of uncertainty for Federal employees, and that has a significant impact on morale both at EERE and across the government, as well as the government's ability to recruit and retain talented employees.

So I thank you again for the opportunity to be here on behalf of the skilled and talented employees NTEU (National Treasury Employees Union) represents at EERE, and I look forward to your questions.

[The prepared statement of Mr. Reardon follows:]

STATEMENT OF ANTHONY M. REARDON
NATIONAL PRESIDENT
NATIONAL TREASURY EMPLOYEES UNION

MANAGEMENT AND SPENDING CHALLENGES WITH THE DEPARTMENT OF ENERGY'S OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

BEFORE THE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON INVESTIGATIONS & OVERSIGHT AND
SUBCOMMITTEE ON ENERGY
UNITED STATES HOUSE OF REPRESENTATIVES

FEBRUARY 5, 2020

Chairman Foster, Chairwoman Fletcher, Ranking Members Norman and Weber, and distinguished members of the Subcommittees, thank you for the opportunity for NTEU to make this statement on behalf of the Department of Energy (DOE) employees we represent. As President of the National Treasury Employees Union (NTEU), I have the honor of leading a union that represents 150,000 federal employees at 33 agencies, including employees at DOE and its Office of Energy Efficiency and Renewable Energy (EERE).

The mission of EERE is to create and sustain American leadership in the transition to a global clean energy economy. Its vision is a strong and prosperous United States of America powered by clean, affordable, and secure energy. The employees at EERE are committed to the long-standing principle that government-funded research is necessary because it provides the seed money for innovative ideas that aren't yet viable in the private sector.

Funding Uncertainty for EERE

According to the Energy Department's own statistics, the $20 billion taxpayer investment in EERE over the last 12 years has yielded a net economic benefit to the country of $230 billion. EERE supports research and development that is used in advanced manufacturing, biofuels, modernizing the national power grid, electric cars, solar power and wind energy.

Despite its clear economic benefits, the Administration's budget requests for the past three years have called for at least a 70 percent, or $1.4 billion, reduction in funding to EERE.

Such cuts would cripple the mission of EERE, undercut their work that directly translates to private sector growth and investment, and would require the agency to lay off much of the workforce. These proposed cuts to EERE was opposed by both advocates of science and the skilled scientific professionals that work at EERE. EERE exemplifies a hallmark of our country: the willingness to push the envelope of research. The federal employees who work in this office should be commended, not pink-slipped.

This funding uncertainty also impacts the laboratories that are funded by EERE. These private labs have had to figure out how to ensure they will be able to retain staff and continue operations in the face of the budget uncertainty that comes from government shutdowns and significant proposed budget cuts. Further, for EERE project managers overseeing the projects at these labs, it makes their reviews a more time-consuming task for no good or useful purpose.

Ernest Moniz, the former U.S. Secretary of Energy and a nuclear physicist, called the proposed budget cuts a retreat from our nation's commitment to clean energy research. He noted the proposed budget would have "put us behind China and Europe, blunting our competitive edge in a multi-trillion-dollar developing clean energy global market."

Unsurprisingly, the proposed budget cuts also created an unfortunate morale crisis for the employees at EERE. The scientists, mathematicians and engineers who work in this office could be earning much larger paychecks elsewhere but chose a career in civil service out of a desire to serve their country. These career employees are experts in their scientific fields and these proposed budget cuts were insulting to them and the value of their work. It was difficult to understand how employees dedicated to their work and deeply skilled in their field could be dismissed in this way.

Former EERE employees with immense knowledge and expertise have told us they retired earlier than originally planned because of declining morale. Mid-career employees have taken other positions either within DOE or outside the Department, where they tell us they feel much more valued for their talent and skill. If the agency's goal is to build a workforce that feels both valued and respected, the agency needs to vastly improve in its treatment of employees.

NTEU is grateful that Congress has so far rejected the Administration's proposed funding cuts to EERE. We certainly hope that this year's budget request, expected to be released next week, will include adequate funding and we urge Congress to continue to ensure EERE receives the funding it needs.

Staffing Shortages

While Congress has ensured EERE has the funding it needs, the office is significantly understaffed. Due to several issues, including hiring failures by management and poor employee relations, EERE is currently operating with only 553 FTEs, down from 710 FTEs in January of 2017. While EERE has managed to hire some new employees, it has clearly failed to hire the staff it needs. As a result, important work is left undone or done more slowly and employees are overburdened, making EERE an even less attractive place to work as it seeks to fill positions.

Employees have told us that they have been required to stretch the limits of their expertise as they are asked to handle more projects and more types of projects. This type of strain has led to faster burnout, negative work dynamics and increased attrition. In addition, the lack of adequate staffing has resulted in fewer site visits to monitor and ensure projects funded by EERE are on track. Employees cannot visit as many places with the higher workload they bear, which also adversely impacts the economic benefit provided by EERE.

Recognizing the need for more physical scientists and engineers, EERE held a hiring fair July 2019 that yielded some new hires and transfers. Still, due to attrition, overall staffing levels have remained stagnant. There have been at least 20 transfers out of EERE, vastly outpacing the number transferred to EERE. In addition, at least some of these transfers were not performed in accordance with the collective bargaining agreement in place or with proper notice, and employees have told us that they were dismayed at the lack of process and explanation. Employees have also reported that there is a strong perception that EERE management does not value longer-tenured employees and seems to encourage eligible employees to retire rather than stay with EERE. This has been borne out in union grievances, EEO complaints, and union intervention with management.

While the 2017 hiring freeze guidance was lifted, many stringent and hampering conditions and approvals still seem to be standing in the way of hiring at EERE. It is our understanding that DOE Human Resources has had vacant positions pending classification and next steps in the hiring process since the summer of 2019. We understand the agency plans to hire at least 80 FTE, but so far, we have seen no evidence that they have been taking the steps needed to get actually fill these positions.

Broader Challenges

In addition to the particular challenges within EERE, the past few years have been a trying time for all civil servants who work hard every day for the American people. Federal employees have faced government shutdowns and recurring threats of government shutdowns. They have been subjected to unnecessary forced relocations and proposed agency closures. They have been disparaged by government leaders who refer to career federal employees as bureaucrats or swamp creatures. Federal employees have faced pay freezes, hiring freezes, threatened cuts to employee benefits, elimination of key work-life balance benefits such as telework, and on-going efforts to roll back employee collective bargaining and due process rights and protections. When the Acting White House Chief of Staff talks about forced relocations as a measure to "drain the swamp" and remove employees, employees do not feel that their agency leaders and the administration support them. This is no way to effectively recruit and retain skilled employees.

A recent report by the Permanent Subcommittee on Investigations of the Senate Homeland Security and Governmental Affairs Committee noted that in the last five years, repeated government shutdowns cost taxpayers nearly $4 billion. However, the cost is not simply based on the denial of government services -- some agencies reported an impact on their

ability to hire new employees due to the shutdown. According to media reports, students, including those with critical science and technical skills who were considering jobs at federal agencies, were rethinking their career paths after the shutdown. And in January 2019, according to a survey of 1,940 government workers affected by the shutdown who were using ZipRecruiter to look for work, 67 percent said the shutdown made them consider leaving government employment to seek work in the private sector and 89 percent of those looking for work said the shutdown was causing them a significant financial hardship.

The extent to which employees feel passionate about their jobs and are committed to the organization has a direct link to the ability of agencies to recruit and retain skilled employees, improve performance, and meet their missions. However, ongoing attacks on employees and their pay and benefits undermine efforts to compete with the private sector for top talent and serve the American people.

Unfortunately, according to the Federal Salary Council, years of below-market pay raises and pay freezes have increased the pay disparity between the federal government and the private sector to 26.71 percent, despite a 1990 federal law aimed at reducing the pay gap to 5 percent. This has a significant impact. While many federal employees believe in government service and agency mission is often listed as the number one reason they work for the federal government, massive pay disparities with the private sector undermine morale and efforts to recruit and retain skilled individuals who are drawn to public service.

While the President's FY 2020 budget request called for another pay freeze for 2020, NTEU is pleased that the President reversed course and, that in the end federal employees received an average 3.1 percent increase, comprised of a 2.6 percent across-the-board raise with 0.5 percent for locality pay, in the final FY 2020 funding agreement. Federal employees, like all other Americans, face rising food, utility, college, and health care costs. Adding to employees' concerns over pay are the Administration's proposals to slow the frequency of within grade step increases and limit the distribution of awards. We hope that the President's budget released next week will not include proposals to freeze or reduce pay and awards for federal employees and urge Congress to ensure federal employees receive a fair pay increase in 2021.

Attacks on federal employee benefits is another factor that impacts employee morale. According to the 2017 OPM Federal Benefits Survey, employees expressed that their TSP, FERS/CSRS and FEHBP benefits were extremely important to them (96.1%, 94.2% and 90.6% of respondents respectively). In fact, not only is the availability of a retirement annuity important to employees, the benefit has been shown to play a key role in recruiting and retaining them. In the 2017 survey, 78.3 percent of participants indicated that the availability of a retirement annuity through the FERS or CSRS influenced their decision to take a job with the federal government to a "great" or "moderate" extent, which is more than a six-point increase from the 2015 survey (72.2%). The trend is the same when looking at how FERS/CSRS impact retaining employees, with 87.9 percent of participants indicating that FERS/CSRS influenced their decision to remain with the federal government to a "great" or "moderate" extent, a three-point increase from 2015 (84.5%).

Despite this, the Administration's FY 2020 budget proposal included several proposals to cut federal employee and retiree benefits that, if adopted, would exacerbate the existing hiring and retention challenges. Once again, in an effort to cut government spending, federal employees were being asked to pay for unrelated funding decisions by paying more for their benefits while simultaneously reducing the value of those benefits.

The Administration has also proposed changes to the Federal Employees Health Benefits Program (FEHBP) that would modify the amount of the premiums that would be paid by the government by tying the contribution rates to each plan's performance rating. For many FEHBP enrollees, this would mean that the government's overall contribution rate would be lower than it is now, requiring enrollees to pay significantly higher premiums. Such a change would force employees to drop coverage or move to cheaper plans that provide less coverage and fail to meet the health care needs of their families.

The availability and affordability of the FEHBP has a significant impact on recruitment and retention. In 2017, 71.2 percent of those who responded to the OPM Federal Benefits Survey reported that the availability of health insurance through the FEHBP influenced their decision to take a federal job to a "moderate" or "great" extent, while 80.9 percent of respondents reported that the availability of health insurance through the FEHBP influences their decision to stay with their job to a "moderate" or "great extent."

Given the popularity of these critical retirement and healthcare benefits, efforts to reduce them will have a significant impact on the ability of the federal government to recruit and retain skilled workers at DOE and other agencies and NTEU urges Congress to oppose such efforts.

Federal Employee Rights and Protections

Another significant cause of DOE employees' concern are recent EOs that undermine federal employee unions and our ability to operate in federal workplaces. These EOs are currently being implemented at the bargaining table for agencies, including DOE, that are engaged in negotiations with their respective unions but are being challenged in the courts. Federal law clearly states that the right of employees to organize, bargain collectively, and participate through labor organizations in decisions which affect them safeguards the public interest and contributes to the effective conduct of public business. Front-line employees and their union representatives have ideas and information that are essential to improving the delivery of quality government services to the public. Through the collective bargaining process and the use of pre-decisional involvement, employees can have meaningful input resulting in better quality decision-making, more support for decisions, timelier implementation, and better results for the American people. It is important that these rights are maintained, and employees continue to have a voice in their workplace.

However, the Administration has engaged in an all-out assault on employee rights and protections—ignoring requirements to bargain in good faith, gutting collective bargaining agreements, imposing one-sided contracts, undermining employees' rights in the grievance process, giving greater deference to agency management in disputes, and eliminating

opportunities for employees to have a voice in their places of work. NTEU opposes all efforts to roll back the limited rights provided to federal labor unions, including limits on our ability to represent employees to ensure they are treated fairly and have a voice in the workplace. Such changes eliminate opportunities for employees to feel engaged and comfortable working with their agency leaders, thereby impacting retention.

Moreover, we oppose changes to employee due process rights, such as shortening the length of certain notice and response periods, limiting the ability of the Merit Systems Protection Board to mitigate penalties, and providing agencies with additional flexibility to use longer probationary periods, making those employees essentially at-will. These efforts can be used to intimidate workers into silence out of fear of retaliation for disclosing waste, fraud, and abuse.

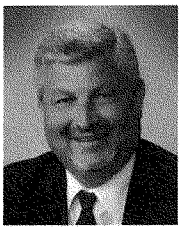
Imposing anti-worker policies that eliminate fair and equitable treatment and instead create a culture of fear and mistrust is no way to attract and retain talented workers. NTEU is strongly opposed to these EOs and asks that Congress move to protect federal employee collective bargaining rights.

Scientific Integrity

While I am troubled about issues of morale, staffing and management at EERE, I do want to take a moment to thank the members of this committee for advancing legislation to protect the integrity of the scientific research done by employees at EERE and across the government. Because of the highly skilled nature of work at EERE and the incredible talent of its employees, nothing has the potential to impact morale, recruitment and retention at EERE more than outside, political interference in their fact-based work. EERE employees are highly trained experts in their fields and their work should not be subject to politically based alterations or pressure. That is why NTEU deeply appreciates that the Science Committee gave bi-partisan approval to H.R. 1709, the Scientific Integrity Act, which was introduced by Representative Tonko of this Committee and co-sponsored by you both, Dr. Foster and Representative Fletcher, as well as Mr. Baird of the subcommittee. Thank you for your work on this legislation. Should it be enacted, as NTEU hopes, it will have a positive impact on protecting scientific integrity at EERE and elsewhere in the federal government.

Thank you again for the opportunity to share NTEU's views on how DOE can build the most effective workforce, attract skilled and talented individuals, and engage federal employees at EERE throughout their careers.

NTEU
National Treasury Employees Union



Anthony M. Reardon
NTEU National President

Anthony M. Reardon (Tony) is the National President of the National Treasury Employees Union. As the union's top elected official, he is the spokesman for the union and represents NTEU with the media, Congress and agency leadership on issues of importance to union members and federal employees. He leads NTEU's efforts to ensure dignity and respect for all federal workers.

Reardon is committed to working with NTEU chapter leaders and members to construct a shared vision for NTEU's future, one that prepares the union to meet the challenges ahead. He believes strongly that federal employees deserve fair pay and a secure retirement and has fought to give them the tools and resources they need to do their jobs.

Since his 2015 election as National President, Reardon has led the union and its members in obtaining federal pay increases and, in 2019, overturning a pay freeze. NTEU has successfully fought a number of threats to federal employees and the union's ability to represent employees, while also expanding congressional support for the federal workforce. Reardon has pursued an aggressive legal strategy to protect employees after the cyberbreaches at the Office of Personnel Management, defend a historic legal victory against anti-employee executive orders, and bring an end to federal government shutdowns.

In 2016, President Obama appointed Reardon to the National Council on Federal Labor-Management Relations and the Federal Salary Council.

Reardon graduated from DePaul University in Chicago with a bachelor's in finance. He and his wife, Dawn, have four children and reside in Mount Airy, Md.

Chairman FOSTER. Thank you. And the Chair will now recognize Mr. Krishnaswami.

TESTIMONY OF MR. ARJUN KRISHNASWAMI, POLICY ANALYST, CLIMATE AND CLEAN ENERGY PROGRAM, NATURAL RESOURCES DEFENSE COUNCIL

Mr. KRISHNASWAMI. Thank you, Chair. Good morning, Chair Foster, Chairs Johnson and Fletcher, and Ranking Members Norman, Weber, and Lucas. My name is Arjun Krishnaswami, and I appear today on behalf of the Natural Resources Defense Council. Thank you for the opportunity to address troubling trends in the Trump Administration's management of DOE programs, including EERE and ARPA-E (Advanced Research Projects Agency—Energy).

I will make three key points. First, DOE's programs are impactful, popular, and have strong bipartisan support. Second, the programs have faced significant delays in spending and holdups to hiring. And third, Congress can and should act to remediate these issues.

To my first point, DOE's clean energy innovation work has already had a profound positive impact, including through millions of clean energy jobs and bill savings for everyday Americans. In fact, every dollar invested through EERE programs results in about $33 of benefit to the American people. These are wise investments of taxpayer investments—of taxpayer dollars.

Thankfully, these programs have received bipartisan support from Congress. Congress has rejected President Trump's serious cuts and instead increased funding for clean energy R&D. But when the Administration fails to spend the money that Congress gives it, the American people miss out.

Which brings me to my second point. These programs have faced serious delays in spending and holdups to staffing. NRDC began tracking spending patterns for ARPA-E and EERE in 2018 using publicly available data, which is why I'm here today. Our analysis found that both offices were significantly behind on spending their appropriated money over the past 2 years. ARPA-E hadn't spent between 80 and 90 percent at the end of each fiscal year. And EERE hadn't spent 14 to 18 percent. That's about $300-$400 million in unspent funds for EERE. That's a result of both issuing and announcing FOAs late and not following the expected timeline to spend that money, including delays in the Solar Office, the Wind Office, and the Waterpower Office over the last 2 years.

As a result, both offices carry large sums of unspent any into 2020. For EERE, as has been noted, the carryover balance was equal to about 1/3 of its annual budget. That's the greatest carryover in at least the last 10 years, and ARPA-E similarly carried a carryover balance equal to about the annual budget of the agency.

I want to make one note here, which is that though there have been carryover balances in the past, the—prior Administrations have not proposed to cancel unspent money, whereas under this Administration, the Administration has proposed to cancel unobligated balances every year, 2017, 2018, and last year 2019. So the—there's extra diligence due here around carryover balances.

Put simply, these delays and carryovers that I've noted mean that less money is getting to researchers and businesses to do their

critical work. That's money that Congress has said it wants invested in clean energy R&D.

In a related troubling trend, EERE has become severely understaffed, meaning that a smaller staff must manage significantly more money. If the office has been—had maintained the same funding-to-staff ratio present at the end of the prior Administration, it would have 950 full-time equivalents as opposed to approximately 550 that were in place last year. We heard earlier today that that number has actually decreased since last summer. That's 400 fewer employees to do the same amount of work. Understaffing contributes to funding delays, reduced morale for Federal employees, and higher attrition that create a vicious cycle for these problems.

To summarize what we've observed, an agency with large amounts of unspent money, a history of delays and cancelations getting money out the door, and an increasing budget is deciding to hold up staffing and reduce staffing, all at a time when the agency should be spending the money more quickly and staffing up to comply with congressional will and support American innovators and businesses.

These trends do not make sense unless you consider them in the context of the Administration's explicit proposals to gut these programs. As you've heard, the last three budget request would have totally eliminated ARPA-E and cut EERE funding by 70, 71, and 86 percent respectively. Two of the requests, as I noted, also proposed canceling unspent funds from prior years, and each request proposed to cut staff. Even though Congress has outright rejected these proposals, the agency has delayed funds and reduced staff, as we've shown.

That leads to my third and final point, which is that these issues merit congressional action. Increased oversight, including hearings like this one, can help identify problems and encourage the agency to execute its important research and development mission. I was pleased to hear from Mr. Simmons about the FOA announcements over the last 2 days leading up to this hearing and the publicizing of open positions in EERE. We hope that progress continues.

I'll just say these programs need to expand, and with larger programs it will be even more critical to do this work. We hope you take these steps, and I thank you for the opportunity to discuss them in more detail.

[The prepared statement of Mr. Krishnaswami follows:]

Written Testimony to the
U.S. House of Representatives, Committee on Science, Space, and Technology
Subcommittee on Investigations and Oversight and Subcommittee on Energy

Management and Spending Challenges Within the Department of Energy's Office of Energy Efficiency and Renewable Energy

Arjun Krishnaswami
Policy Analyst
Natural Resources Defense Council
February 5th, 2020

Good morning Chair Johnson, Ranking Member Lucas, Chair Foster, Ranking Member Norman, Chair Fletcher, Ranking Member Weber, and distinguished Members of the Subcommittees. My name is Arjun Krishnaswami, and I am a Policy Analyst representing the Natural Resources Defense Council (NRDC). Thank you for the opportunity to speak with you today about the disturbing trends in the Trump administration's management of the historically successful applied energy programs housed within the U.S. Department of Energy. Specifically, I will discuss DOE's cancelation of $46 million in solar research and development, NRDC's analysis of politically motivated delays in spending, and attempts to starve EERE of staff to constrain the clean energy programs. I will also share a vision for expansion and curation of the agency to effectively combat the climate crisis.

I appear on behalf of NRDC's more than three million members and online activists, who have benefitted from DOE's clean energy successes to date. Our members, like all Americans, rely on a well-functioning energy system and, in the face of climate change risks, are counting on increased funding for—and proper management of—the agency's programs.

I look forward to discussing these issues and working with Congress toward solutions today and in the future. Let me begin with an overview of why the programs that are the focus of my testimony—including EERE and the Advanced Research Projects Agency–Energy (ARPA-E)—are so important.

I. DOE innovation programs are a smart investment for the environment and the economy

Increased public investment in clean energy innovation is essential to maintain U.S. competitiveness in a changing global economy, bring the economic benefits of clean energy to more people, and combat climate change.

Addressing the climate crisis will require total, rapid transformation of global energy systems, including increasing energy efficiency and zero-emission power generation at record pace, efficiently electrifying buildings and transportation systems to replace fossil fuel use, and transitioning industrial processes to be carbon neutral. To achieve this transformation, the United States needs a comprehensive set of policy and technology solutions to accelerate the clean energy transition in a way that provides good quality jobs for millions more Americans and leaves no people or communities behind in the new clean energy economy.

Innovation—including research, development, demonstration, and deployment—is an essential component of the necessary policy toolkit. Federal innovation programs have already helped bring us the technology solutions driving growth in the clean energy economy, and expansion of these programs will improve existing technologies and commercialize new ones to make the transition occur at a lower cost, on a faster timeline, and with greater benefits for more people.

A robust federal innovation program will not only help the nation address climate change but also help ensure that the United States is a global leader in renewable energy, energy efficiency, clean industry and manufacturing, sustainable transportation, and grid modernization. Given the trillions of dollars of projected investments in global energy markets in the coming years, countries that take decisive action to advance the clean energy economy, including a commitment to innovation, will set themselves up to lead the global response to climate change while also ushering in a new age of economic prosperity. [1]

Congress's investments in DOE have generated huge returns for the American people. Nearly 40 years of federally funded research and development has helped enable plummeting costs for cornerstone clean energy technologies such as highly efficient LED lighting, electric vehicle batteries, solar panels, and wind turbines. For example, thanks in large part to DOE's Solar Energy Technologies Office, the cost of installing large solar farms decreased by more than 74 percent in the last 10 years, enabling solar technology to grow from a novelty that powers our calculators to a serious grid player that produces enough electricity to operate more than 11 million U.S. homes.[2] Thanks to this growth, the solar industry employed about 335,000 people across the country in 2018.[3]

These and other successes demonstrate that DOE's Office of Energy Efficiency and Renewable Energy is a commonsense use of taxpayer money. Third-party, peer-reviewed evaluations of EERE programs estimate that for every taxpayer dollar invested through EERE, the United States gains $33 in economic benefits.[4]

Failure to deploy available funding in a timely fashion—as has been occurring—is a missed opportunity to cash in on these rewards and take advantage of a narrowing window to commercialize and deploy technologies to urgently address climate change. Moreover, when DOE delays or fails to distribute funds, the agency is flouting Congressional intent.

II. DOE's actions are slowing clean energy benefits from reaching the American people

Since the Trump Administration took over in 2017, several DOE management irregularities have come to NRDC's attention, raising concerns that the agency may be mismanaging appropriated money for political goals and preventing valuable innovation funds from reaching researchers and businesses. Below is a list of these troubling instances, alongside the corresponding analysis that NRDC and others performed to unpack the implications. These examples make it clear that we need increased

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[1] International Energy Agency, "World Energy Outlook," https://www.iea.org/topics/world-energy-outlook.

[2] NRDC, "Revolution Now," https://www.nrdc.org/revolution-now

[3] Environmental Entrepreneurs (2019), "Clean Jobs America," https://www.e2.org/wp-content/uploads/2019/04/E2-2019-Clean-Jobs-America.pdf

[4] Dowd, Jeff (2017), "Aggregate Economic Return on Investment in the U.S. DOE Office of Energy Efficiency and Renewable Energy," https://www.energy.gov/sites/prod/files/2017/11/f46/Aggregate%20ROI%20impact%20for%20EERE%20RD%20-%2010-31-17%20%28002%29%20-%2011-17%20%28optimized%29.pdf

congressional oversight and reauthorization of DOE's clean energy programs to ensure responsible management of federal funds. While I understand the hearing is focused on issues with EERE management, I also include distressing examples of possible mismanagement of the Advanced Research Projects Agency–Energy (ARPA-E) because I believe that these examples reflect the same worrying trends that have affected EERE.

Cancelation of Solar Funding Opportunity Announcement

DOE canceled $46 million in R&D funding for solar energy in August 2018, after the funding opportunity had been approved by DOE and EERE leadership, received significantly more applications than could be funded, and completed the in-person merit review process. A freshly named acting political official was responsible for canceling the Funding Opportunity Announcement (FOA) in her short time heading the office. This incident raises questions about the effect of the administration's political agenda on DOE funding processes, especially given that the administration has proposed devastating cuts to the solar program year after year. We urge the subcommittee to further investigate potential mismanagement and waste associated with the FOA cancelation in order to prevent similar issues from occurring in the future.

Then-Secretary Rick Perry announced a $105 million FOA for solar energy technologies on April 17, 2018. The FOA was the solar office's main competitive funding opportunity for FY18 and was comprised of four topics. Topic 1 included $46 million for advanced systems to integrate solar resources onto the grid. Concept papers were due on May 9, 2018, full applications were due on July 5, 2018, and the in-person merit reviews were scheduled for the third week of August. During the application process, Topic 1 received 367 concept papers, and 92 entities went on to apply for approximately 14 awards. The process went ahead as planned through the merit review process in August. Then, on August 31, 2018, DOE abruptly canceled Topic 1 and announced a Notice of Intent to issue a new FOA for the same topic in mid-September. More than 300 applicants were notified they had to reapply to be eligible for the new FOA, after spending up to tens of thousands of dollars on their original applications.

My testimony includes information from records produced as part of Freedom of Information Act litigation brought by Democracy Forward against the Department of Energy regarding the FOA cancelation. Democracy Forward is a non-profit organization that works to expose and litigate corruption in the executive branch of the federal government. The records provide useful information to understand the timeline, impact, and, to some extent, the justification of the FOA cancelation, as well as details on who was involved in the process. They also raise additional questions about the canceled FOA that merit further investigation to clearly understand why the FOA was canceled and how to prevent similar issues in the future.

On July 5, 2018, midway through the Topic 1 process, it was reported that Cathy Tripodi was appointed to the position of Acting Assistant Secretary for EERE after Dan Simmons was nominated to fill the position of Assistant Secretary on a permanent basis.[5] Five days later, the documents show, Tripodi was notified that it would be very difficult to change the criteria for active FOAs because "It is too late to change any of the criteria for any FOAs that have already closed" and "if we were to change the criteria for any that are still open, we'd need to publish a FOA amendment and extend the open timeframe for

[5] Marsha, Christa, "Trump taps former solar lobbyist as acting renewable chief," July 5, 2018 https://www.eenews.net/stories/1060087939/.

all applicants."[6] The application period for the solar FOA had closed on July 5, the day that it was reported Ms. Tripodi entered into her new role. Despite being warned of the difficulty of amending the FOA so late in the process, the emails show Ms. Tripodi proposed to rewrite Topic 1 on July 30.[7] She specifically noted that "we can just do an amendment to change [the FOA],"even though the FOA application period had closed almost a month prior.[8] On August 20, Ms. Tripodi was awaiting updated Topic 1 language from the Office of Electricity (OE) in order to adjust the FOA.[9] Meanwhile, DOE held in-person merit review the previous week, and the Federal Consensus Panel—to confirm the selections that the reviewers recommended—was ongoing as Ms. Tripodi awaited edits to the FOA.[10] The emails show that on August 27, Ms. Tripodi received suggested language from OE.[11] On August 31, EERE issued a cancelation of Topic 1.[12]

Cancelation of the FOA wasted federal resources. DOE invests significant resources into designing and writing FOAs, reviewing applications, and coordinating review processes. Each FOA takes significant staff and contractor time, as well as the time and resources spent by merit reviewers. Because DOE canceled Topic 1 of the FOA so late in the process, most of these resources had already been expended: staff had written the FOA and shepherded it through the entire approval process, reviewed concept papers, invited entities to apply, and coordinated the merit review process.

In total, DOE may have squandered close to **$1 million**, including staff and contractor time and reviewer compensation. This internal DOE estimate was revealed in an August 29 email from a Solar Energy Technologies Office program manager to Ms. Tripodi.[13] This estimate does not include the resources spent by the businesses and researchers that applied for the canceled FOA, which could equal up to tens of thousands of dollars per applicant.[14]

Though the harmful impacts of the cancelation are severe and warrant the attention of Congress, the most worrisome takeaway is the indication of deep politicization of DOE. DOE should be guided by science- and merit-based decision-making to advance the goals set by the agency's authorizing statutes, within the bounds set by congressional appropriations. The details of DOE's grantmaking should be championed by the career employees, who include some of the nation's foremost experts on clean energy technology and are an integral reason why DOE funds have been so effective to date. However, the process leading up to the cancelation of Topic 1 suggests a divergence from this career-staff-driven approach in favor of a process designed to meet political objectives.

DOE published the initial solar FOA in April 2018, after making it through the full formal review process by political leadership. Daniel Simmons, who at the time was serving as the Principal Deputy Assistant

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[6] July 10 email to Cathy Tripodi, Attachment 1.1.
[7] July 30 email from Cathy Tripodi, Attachment 1.2.
[8] July 30 email from Cathy Tripodi, Attachment 1.2.
[9] August 20 email from Ian Hamos, Attachment 1.3.
[10] August 21 email to Cathy Tripodi, Attachment, 1.4.
[11] August 27 email from Cathy Tripodi, Attachment 1.5.
[12] August 31 email from Diana Bobo, Attachment 1.6.
[13] August 29 email from Lenny Tinker, Attachment 1.7.
[14] Kern, Rebecca, "Nixed Solar Grant Opportunity Cost $500,000, Drawing Hill Scrutiny," December 4, 2018, https://news.bloombergenvironment.com/environment-and-energy/nixed-solar-grant-opportunity-cost-500-000-drawing-hill-scrutiny-1

Secretary for EERE, approved the FOA in November 2017. Earlier in 2017, DOE instituted a new approval process for financial assistance actions, including for FOAs, to ensure that all new work funded by the department was consistent with the administration's priorities.[15] A February 2018 Government Accountability Office report noted that "DOE officials said that a key benefit of the fiscal year 2017 review process was an opportunity to better identify and coordinate future financial assistance department-wide on crosscutting issues" and "DOE plans to review fiscal year 2018 financial assistance *prior to issuing funding opportunity announcements to the public* [emphasis added], and thus before any recipients apply or are selected".[16] Therefore, the FY18 solar FOA must have undergone review through the new process and received the political stamp of approval to be released.

Despite this, Ms. Tripodi, an acting political appointee, was able to upend the process and cancel the FOA. Furthermore, EERE amended the manual that governs the FOA-approval process on August 31, 2018, the same day that Topic 1 was canceled.[17] Though the details of the approval process changes were not available in the Democracy Forward productions, the timing of the change is suspicious. It raises the question of whether EERE followed the original set of procedures when canceling and reissuing the Topic 1 FOA or instead amended the rules to be able to cancel and reissue the FOA. It also brings into question the role of political appointees in changing the details of financial assistance outside of the designated review process.

While the revised FOA was eventually issued and the funds were distributed, the events that transpired in the canceling and reissuing of Topic 1 are indicative of deeper problems in DOE's structure and procedures under this leadership that allow political appointees to upend financial assistance processes and potentially change these processes to suit political outcomes. We encourage the committee to explore steps it can take to ensure the growing EERE budget is managed with scientific integrity and without undue political influence.

Spending Patterns at ARPA-E and EERE

Persistent delays in EERE and ARPA-E spending over the last three years are damaging to the success of the programs and hint at the profound influence of the political agenda of the administration, which has proposed elimination of ARPA-E and disastrous cuts to EERE in the budget request each year.

The first incident of delayed spending arrived promptly in the new administration. In December 2017, the Government Accountability Office (GAO) found that ARPA-E had impounded—or intentionally withheld—$91 million of appropriated funds in FY17.[18] DOE leadership instructed ARPA-E to withhold $91 million of FY17 funds "in anticipation of congressional enactment of the legislative proposals in the [president's FY18] budget request."[19] The FY18 budget request proposed to eliminate ARPA-E, canceling

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[15] Government Accountability Office, "New Process to Review Financial Assistance for Research Projects Created Uncertainty," February 2018, https://www.gao.gov/assets/700/690391.pdf.
[16] Ibid.
[17] DOE FOA Development Standard Operating Procedure EERE S 540.110 in the productions, Attachment 1.8.
[18] Government Accountability Office, "Impoundment of the Advanced Research Projects Agency-Energy Appropriation Resulting from Legislative Proposals in the President's Budget Request for Fiscal Year 2018," December 2017, https://www.gao.gov/assets/690/688941.pdf.
[19] Ibid.

$46 million in FY17 funds and using $45 million of unobligated funds to close out the agency.[20] Though the budget request was fully rejected by Congress, DOE used it as a justification to restrict deployment of ARPA-E funds.

This incident raised alarms for NRDC because of the potential that DOE could be withholding or delaying spending throughout the clean energy programs. As a result, in 2018, we began reviewing publicly available data to track spending by EERE and ARPA-E, and we quickly found additional delays. We compiled these data based on grant announcements in EERE Exchange, ARPA-Exchange, grants.gov, the EERE and ARPA-E websites, and information from budget requests.

In December 2018, we found that EERE and ARPA-E were behind on spending their FY18 appropriated funds. Our analysis suggested that, as of the beginning of December 2018, two months after the end of FY18, ARPA-E had not spent 79 percent of its FY18 budget, and EERE had not spent 14 percent.[21] Several technology offices were behind their stated schedules for selecting projects to award funds. For example, the Water Power Technologies Office was scheduled to award $25 million in FY18 funds by September 2018 but had only awarded $3 million of that total by December.

After the publication of our analysis in December 2018, EERE and ARPA-E released more FY18 funds, though ARPA-E still was allocating FY18 funds at the end of January 2019, four months after the end of the fiscal year.[22]

In October 2019, we updated our analysis to assess EERE's and ARPA-E's progress through the end of FY19. The data suggested that EERE was in a similar situation to the previous year, with about 4 percent of the office's funds unallocated and 18 percent unspent. Based on the publicly available announcements, ARPA-E was even worse off, with 48 to 68 percent of its funds unallocated and up to 91 percent unspent.

Our original analysis showed that several programs—including ARPA-E and EERE's building, solar energy, geothermal, and water power technologies offices—began releasing FY18 FOAs very soon after passage of the spending bill in March. That trend suggested that the delayed passage of the bill may have contributed to the delays in spending for FY18. However, several EERE offices released their FY19 FOAs on a similar delayed timeline as FY18, even though the FY19 spending bill was passed on schedule (for the first time in 9 years). In other words, FY19 spending was still delayed, despite the agency receiving appropriations on time.

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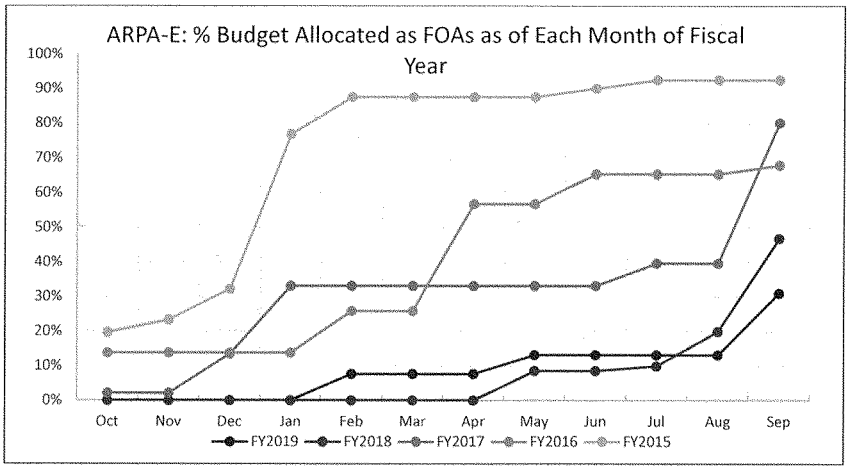
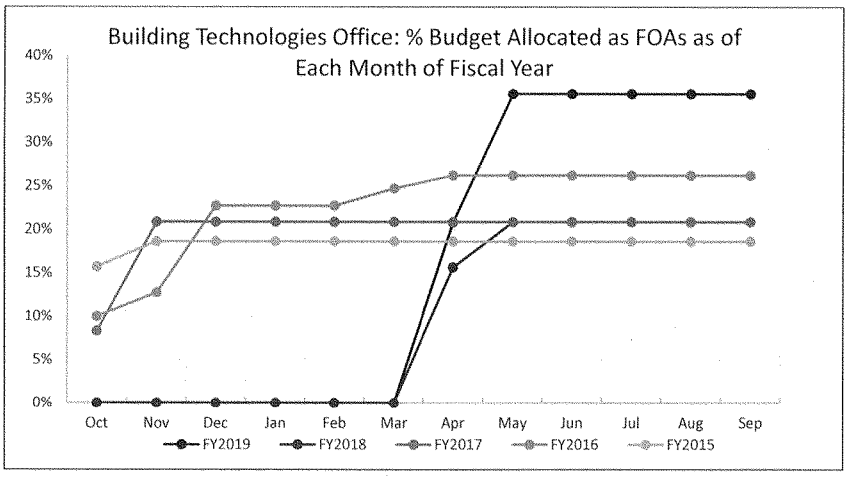
[20] Ibid.

[21] Wong, Jackie, and Madhur Boloor, "DOE Stalls Clean Energy R&D: Risking Jobs & Competitiveness," December 10, 2018, https://www.nrdc.org/experts/jackie-wong/doe-stalls-clean-energy-rd-risking-jobs-competitiveness.

[22] https://arpa-e-foa.energy.gov/Default.aspx?Archive=1#FoaIdf22d5af9-3c00-4dc6-b1b2-53adf72d0841





We also investigated spending trends in EERE and ARPA-E using the SF 133 Reports on Budget Execution and Budgetary Resources from the Office of Management and Budget. At the end of each fiscal year, EERE, ARPA-E, and other energy programs bring unobligated funds from previous appropriations into the budget for the upcoming year. EERE entered FY20 with $820 million of unobligated funds from previous years, a $171 million increase in carryover funds from the previous fiscal year. That means that

EERE's carryover funds are equal to almost one-third of the office's annual budget. ARPA-E entered FY20 with unobligated funds totaling $411 million, or about the size of ARPA-E's annual budget.

The magnitude of carryover funds is an indication of whether DOE is following congressional guidance and spending appropriated funds in a timely manner—and more carryover funds means less money from prior years is getting to clean energy innovators to do their work. A look back at prior years shows that, while EERE and ARPA-E have had significant carryover funds in the past, the unobligated balance EERE brought into FY20 is the largest sum in at least the past 10 years. Moreover, carryover funds in the preceding years were not accompanied by major rescission packages, like the one the Trump Administration proposed in 2018 to cancel $15.3 billion in unobligated balances from prior years.[23]

The high levels of unobligated funds suggest that DOE should take action to catch up on spending and get previously appropriated money out the door in line with Congressional direction. One action DOE can take is to increase staff levels, as I describe in detail next.

Unobligated Balances Carried Over into the Designated Fiscal Year[24]										
[$M]	**FY20**	**FY19**	**FY18**	**FY17**	**FY16**	**FY15**	**FY14**	**FY13**	**FY12**	**FY11**
EERE	$842	$671	$578	$773	$655	$408	$118	$335	$130	$164
ARPA-E	$411	$450	$256	$231	$244	$210	$222	$159		

Staffing Patterns at EERE

NRDC's analysis shows that EERE is understaffed relative to historical staffing levels. The office is neither filling open positions nor opening new positions at the needed pace. As a result, staff are overburdened, compounding the delays in funding, weakening morale, and increasing attrition that worsens the problem. We are concerned that delays in hiring are part of a political strategy to prevent EERE from issuing funds on time, given that every budget request under this administration has proposed to significantly cut EERE staffing numbers. Thankfully, the FY20 appropriations bill required EERE to make a plan to reach a staffing level of 650 full-time equivalents (FTEs) this year, up from an estimated 553 in 2019. We hope that Congress holds the agency to this requirement and continues to issue requirements for additional staff with further increases to the budget to ensure effective management of appropriated funds. Furthermore, it is important that DOE abide by a rigorous hiring process to staff up with well-qualified experts to manage the programs.

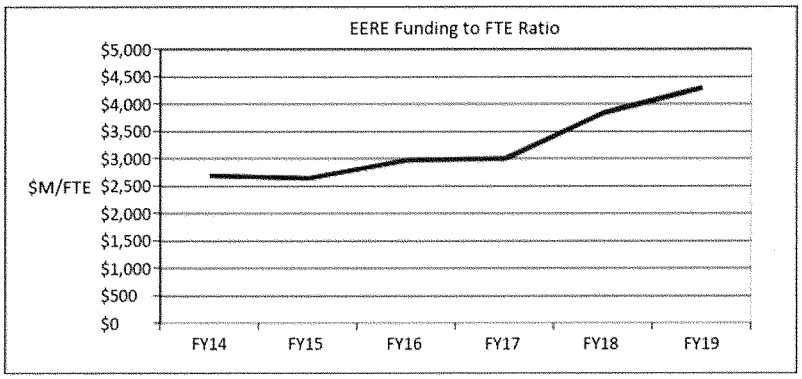
A robust federal workforce is essential to effective management of EERE funds. Staff must have the time and resources to make careful, well-informed decisions about what technologies and projects to invest in. Current staffing levels are too low for optimal management of the money Congress has appropriated—and may be about 40 percent lower than needed. The number of full-time equivalents (FTEs) at EERE has decreased consistently over the past six years, while funding for the office has

[23] Letter from Mick Mulvaney, "PROPOSED RESCISSION OF BUDGET AUTHORITY," May 8, 2018, https://www.whitehouse.gov/wp-content/uploads/2018/05/POTUS-Rescission-Transmittal-Package-5.8.2018.pdf.
[24] Calculated based on SF 133 Reports on Budget Execution and Budgetary Resources from the Office of Management and Budget, https://portal.max.gov/portal/document/SF133/Budget/FACTS%20II%20-%20SF%20133%20Report%20on%20Budget%20Execution%20and%20Budgetary%20Resources.html, Accessed January 29, 2019.

increased. This has led to an increasing ratio of EERE funding to FTEs, as shown in the table and chart below. From 2015 to 2019, the ratio increased by 63 percent. If EERE were to achieve the same funding-to-FTE ratio today as it did in FY17, when the current administration took over, the office would need to be staffed at 950 FTEs. The office currently has about 60 percent of that total, by the most recent available estimates. That means that EERE staff can expend less time and fewer resources designing FOAs, reviewing applications, coordinating new efforts, and making the best decisions about what projects to fund. Understaffing of the office not only affects the effectiveness of spending but also decreases staff morale and creates a vicious cycle of attrition.

EERE Staffing and Funding Numbers						
Fiscal Year	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**	**FY19**
FTEs (actual)	707[25]	697[26]	697[27]	680[28]	605[29]	553[30]
EERE Topline ($M)	$1,900,641[31]	$1,840,847[32]	$2,069,194[33]	$2,040,249[34]	$2,321,778[35]	$2,379,000[36]
Ratio ($M/FTE)	$2,688	$2,641	$2,969	$3,000	$3,838	$4,302

[25] Department of Energy, "Department of Energy FY 2015 Congressional Budget Request," https://www.energy.gov/sites/prod/files/2014/04/f14/Volume%203.pdf#page=278
[26] Department of Energy, "Department of Energy FY 2017 Congressional Budget Request," https://www.energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume3_2.pdf#page=264
[27] Ibid.
[28] Department of Energy, "Department of Energy FY 2019 Congressional Budget Request," https://www.energy.gov/sites/prod/files/2018/03/f49/FY-2019-Volume-3-Part-2.pdf, Page 225.
[29] Department of Energy, "Department of Energy FY 2020 Congressional Budget Request," https://www.energy.gov/sites/prod/files/2019/04/f61/doe-fy2020-budget-volume-3-Part-2.pdf#page=225
[30] If a 90 FTE reduction is equal to 14 percent, then the resulting current FTE value is about 553 FTEs. From Energy and Water Development Appropriations Bill, 2020, Report to accompany S.2470, https://www.congress.gov/116/crpt/srpt102/CRPT-116srpt102.pdf#page=72.
[31] Department of Energy, "Department of Energy FY 2014 Congressional Budget Request," https://www.energy.gov/sites/prod/files/2014/04/f14/Volume%203.pdf#page=20
[32] Department of Energy, "Department of Energy FY 2017 Congressional Budget Request," https://www.energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume3_2.pdf#page=7
[33] Ibid.
[34] Department of Energy, "Department of Energy FY 2019 Congressional Budget Request," https://www.energy.gov/sites/prod/files/2018/03/f49/FY-2019-Volume-3-Part-2.pdf#page=7
[35] Department of Energy, "Department of Energy FY 2020 Congressional Budget Request," https://www.energy.gov/sites/prod/files/2019/04/f61/doe-fy2020-budget-volume-3-Part-2.pdf#page=7
[36] Ibid.



It is striking and worrisome that an office with a growing quantity of unobligated money—which it needs to spend to comply with congressional direction—and a track record of delayed spending would not seek to hire more people to catch up on spending and instead would allow staffing numbers to decline. However, as I discuss next, this trend should not be surprising, given the political agenda of DOE leadership and the administration's track record of trying to cut clean energy programs.

III. Mismanagement of EERE and ARPA-E aligns with the administration's political agenda

We urge the committee to evaluate the management issues at EERE and ARPA-E in the context of the administration's political agenda. Many of the management issues that EERE and ARPA-E have experienced over the last several years align with *explicit proposals* in the president's budget requests.

First, the president's FY18, FY19, and FY20 budget requests proposed to cut EERE funding by 71, 70, and 86 percent, respectively. Each budget proposal also has called for the elimination of ARPA-E. In this context, funding delays and the FOA cancelation appear to be part of a strategy to defy congressional direction and undermine the missions of these offices.

Moreover, the FY18 budget request proposed to use $45 million of unobligated ARPA-E funds to cancel the ARPA-E program, and the FY20 request proposed to use $353 million of unobligated EERE funds as a substitute for FY20 appropriations, effectively nullifying funds that Congress previously appropriated to the agency. It should come as no surprise then if DOE political appointees do not take action to address high levels of EERE unobligated funds carrying over each year or that ARPA-E was reprimanded for illegally impounding unobligated funds in FY2017.[37]

Finally, each budget request has proposed to cut EERE staff, with the latest request proposing a 26 percent cut from the number of FTEs in FY19. Through the budget requests, the administration has been clear about its desire to reduce federal clean energy staff, and the declining number of staff in EERE tracks with this agenda.

[37] Government Accountability Office, *18.*

On top of expressing a desire for EERE cuts in the budget, DOE leadership has exerted greater political control over the office through political appointments to positions formerly held by career staff. In 2019, EERE installed its first-ever politically appointed Deputy Assistant Secretary, followed weeks later by its second.[38,39] In both cases, the new political appointees replaced career employees to run large swaths of the office, one to oversee the renewable power programs (solar energy, wind energy, goethermal technologies, and water power) and the other to lead the energy efficiency programs (building technologies, advanced manufacturing, weatherization and intergovernmental programs, and federal energy management). Moreover, in one case, the new appointee held the joint roles of Deputy Assistant Secretary and Chief of Staff to the Assistant Secretary.

When considered in the context of the administration's explicit agenda to squash EERE and ARPA-E, the mismanagement of these programs is doubly concerning and merits strong oversight, clear direction in appropriations language, and updated authorizations to ensure that the programs continue to operate in a way that advances clean energy solutions and brings greater benefits to the American people.

IV. The Path Forward

Despite the management challenges at EERE and ARPA-E, the programs have continued to fund important and impactful work over the last several years—thanks to continued support from Congress for DOE in the appropriations process. NRDC's April 2019 issue brief, *The Department of Energy's Clean Energy Investments Are Catalyzing Innovation Nationwide,* highlighted clean energy investments made by EERE and ARPA-E in every state of the country in 2017 and 2018.[40] We ask the committee to please add this brief to the record.

However, maximizing the benefits of DOE clean energy programs to the American people at a time when there is a need to urgently respond to the climate crisis requires addressing the persistent management and funding issues with EERE and ARPA-E. To do so, Congress should start by keeping a close watch on EERE through more regular oversight hearings and calling for investigations into examples of potential mismanagement, like the cancelation of the solar FOA. Congress should confirm that DOE follows through on its requirement to increase FTEs and continue to ask DOE for progress reports on spending and staffing. In addition, Congress should provide specific language in appropriations legislation to ensure appropriated funds are spent in a timely manner to address critical challenges for the energy system and combat climate change.

Even with those steps, the long-term solution to these issues requires an update to EERE's statutory authorization. As the committee knows well, the mandates for many EERE programs have not been updated in 15 years. As we noted in our recent report, *Transforming the U.S. Department of Energy in Response to Climate Change* (we ask the committee to please add this report to the record), updated authorizing legislation could modernize the mission of the agency to explicitly include addressing climate

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[38] Northey, Hannah, "DOE: Ex-EPA adviser picked for top renewables job," May 10, 2019, https://www.eenews.net/energywire/stories/1060304607.

[39] Brugger, Kelsey and Hannah Northey, "DOE: Political hire promoted to oversee energy efficiency," June 4, 2019, https://www.eenews.net/stories/1060480019.

[40] Boloor, Madhur, "Transforming the U.S. Department of Energy in Response to the Climate Crisis: Legislative Authorization Principles for Clean Energy Innovation," April 1, 2019, https://www.nrdc.org/experts/madhur-boloor/doe-catalyzes-clean-energy-innovation-all-50-states.

change and recalibrate the goals and priorities for each technology office with the present challenges and opportunities, which will help limit political influence over FOAs.[41] It could also reduce political influence over FOA decisions by reforming review processes and who is able to amend the FOAs—or by mandating Deputy Assistant Secretary and Assistant Secretary positions be filled with members of the career Senior Executive Service Corps, a government-wide pool of high-performing individuals selected for their leadership qualifications that includes the government's best technical and scientific managers.

Moreover, any reauthorization must also significantly increase funding for clean energy research and development and create new programs for demonstration and deployment in order to match the scale of the climate crisis. With significantly more money in DOE's budget, it will be even more important to put in place structures and procedures to make sure the agency is spending funds on time, following congressional direction, and maintaining enough staff to spend money effectively.

Our report includes a wider set of recommendations to reauthorize EERE and OE to better address the climate crisis. Many of our recommendations relate to management of the agency and are designed to help the agency operate more effectively. For example, our recommendations include:

- Establishment of a single Under Secretary for Science and Energy to coordinate efforts across basic science and applied energy programs;
- Creating Assistant Secretary positions for sustainable transportation and buildings and manufacturing and significantly increasing funding for these technology areas;
- Requiring long term portfolio planning across the agency; and
- Making addressing climate change and improved U.S. clean energy manufacturing explicit goals of the agency.

Many of the members on the committee are already championing bills to update EERE and ARPA-E authorizations, and NRDC appreciates their efforts.

We look forward to working with you on these issues. Thank you for your time and the opportunity to testify.

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[41] Shah, Tarak, and Arjun Krishnaswami, "Transforming the U.S. Department of Energy in Response to the Climate Crisis: Legislative Authorization Principles for Clean Energy Innovation," November 13, 2019, https://www.nrdc.org/resources/transforming-us-department-energy-response-climate-crisis-legislative-authorization.

ATTACHMENTS

Attachment 1: Records produced as part of Freedom of Information Act litigation brought by Democracy Forward against the Department of Energy regarding the cancelation of the FY18 Solar FOA.

The following images are selected productions related to the FOA cancelation. The full set of productions will be posted online before the hearing.

1.1

From:	Fitzsimmons, Alexander
Sent:	Tuesday, July 10, 2018 3:51 AM
To:	Tripodi, Cathy
Subject:	FW: FOAs
Attachments:	FY18 FOAs (7-9-2018).xlsx; AMO- Desal NOI- 1949 (FOA-0001905).pdf; GTO - DRAFT - Machine Learning FOA (FOA 1956).docx; WETO - Advanced Wind R&D FOA (FOA 1924).docx; OWIP - FY17 SEP Comp MERIT REVIEW ADVISORY REPORT_7-6-18 _draft.docx

We should discuss

From: Jacob, Bindu <Bindu.Jacob@ee.doe.gov>
Date: Monday, Jul 09, 2018, 9:06 PM
To: Fitzsimmons, Alexander <Alexander.Fitzsimmons@ee.doe.gov>
Cc: Pezzullo, Leslie <Leslie.Pezzullo@ee.doe.gov>, Jayne, Kevin A. <Kevin.Jayne@ee.doe.gov>
Subject: FOAs

Alex,

The full list of FOAs for FY18 is attached in the FY18 FOAs Excel file. We went through and color coded to make this as easy as possible.

Currently we only have six FOAs that have yet to be posted and 21 FOAs that have been posted. Of the 21 that have been posted, we've announced selections for six of them already.

Please keep in mind that the majority of the FOAs that have already been posted have also already closed and are in merit review. It is too late to change any of the criteria for any FOAs that have already closed. If we were to change the criteria for any that are still open, we'd need to publish a FOA amendment and extend the open timeframe for all applicants. We only have five that are still open and four of those close within the next 2 weeks, making it extremely difficult to make any changes at this point. The fifth is the BENEFIT FOA, but they collected concept papers with a deadline of 6/8, and restrict eligibility on full applications without a concept paper.(b) (5)

1.2

From: Tripodi, Cathy
Sent: Monday, July 30, 2018 1:44 PM
To: Walker, Bruce;Lotto, Adrienne;Jereza, Catherine
Subject: Update: Solar Transmission Grid FOA
Attachments: Solar Grid RFP.docx

Hi Bruce, Adrian and Katie:

The solar office has offered to rewrite Topic 1 in their Solar FOA. While it is on the street, we can just do an amendment to change it. Katie and I had reviewed it with the solar Team and we did not understand it and so I was hoping that you all could rewrite it to achieve the grid integration consistent with OEs mission. **Please see** (b) (5)
and give me your suggested language as soon as you can. It is approximately $50 million.

Thank you,
Cathy T.

1.3

From: Hamos, Ian
Sent: Monday, August 20, 2018 9:55 AM
To: Gay, Charlie <Charlie.Gay@EE.DOE.Gov>
Subject: Tim's Summary of Meeting with EE-1

Charlie,

Tim did meeting with EE-1 on Friday, and managed to discuss a couple solar items. Below are his readouts, which both require action from us that Tim asked me to get started.

- Solar FOA Language: EE-1 is still awaiting changes from OE-1 regarding Topic 1. (b) (5) Please let me know thoughts on such action.
- Solar Prize Briefing: EE-1 would like to see the 5 awards put into the standard template that was created for FOAs and then be re-briefed using that form.

I'm here to talk through anything you like, and happy to brainstorm/review as needed.

1.4

Rodriguez, Susan (CONTR)

From:	Unruh, Timothy
Sent:	Tuesday, August 21, 2018 6:35 AM
To:	Tripodi, Cathy
Cc:	Fitzsimmons, Alexander;Hamos, Ian
Subject:	Solar Language
Importance:	High

Do you have any update on the language in the Solar FOA? Last Friday you indicated that it was still under consideration by Bruce Walker. They are holding the Federal Consensus Panel this week, so any information at this time would be useful.

Thanks.

1.5

From: Passarelli, Derek
Sent: Monday, August 27, 2018 6:41 PM
To: Tripodi, Cathy <Cathy.Tripodi@hq.doe.gov>
Subject: RE: Misc1.docx

Cathy,

I have reviewed and run a comparison of the language you provided relative to the original FOA Topic 1 language. (b) (5)

(b) (5)

From: Tripodi, Cathy
Sent: Monday, August 27, 2018 2:18 PM
To: Passarelli, Derek <Derek.Passarelli@ee.doe.gov>
Subject: Misc1.docx

Derek: what do you think of this language? Cathy T.

<< File: Misc1.docx >>

1.6

From: Bobo, Diana
Sent: Friday, August 31, 2018 1:03 PM
To: Passarelli, Derek
Cc: Carabajal, Stephanie
Subject: RE: SETO Notice and Notice of Intent

The NOI has been posted on EERE Exchange. Below is the link.
https://eere-exchange.energy.gov/default.aspx#FoaId2bbe24fe-f075-4d1b-8ab7-0df723807696

The Notices have been sent via email.

Please let me know if you have any questions.

Thank you,
Diana

From: Passarelli, Derek
Sent: Friday, August 31, 2018 12:59 PM
To: Bobo, Diana <Diana.Bobo@ee.doe.gov>
Cc: Carabajal, Stephanie <Stephanie.Carabajal@ee.Doe.Gov>
Subject: RE: SETO Notice and Notice of Intent

Diana,

You may proceed with issuing the Notices and posting the NOI at 1 pm. Please confirm when the actions have been taken.

Thank you.

Derek

1.7

From: Tinker, Lenny
Sent: Wednesday, August 29, 2018 9:48 AM
To: Ulrich, Elaine <Elaine.Ulrich@ee.Doe.Gov>; Jones-Albertus, Becca <Becca.Jones-Albertus@ee.doe.gov>; Kane, Victor <Victor.Kane@EE.Doe.Gov>; Gay, Charlie <Charlie.Gay@EE.DOE.Gov>
Subject: *RE: SETO FOA Topic 1 Cancellation Notice - Federal funds already expended*

Hi Elaine, (b) (5) Reviewer compensation alone was almost this much and during the FOA meeting, we were estimating several person years of DOE staff and contractors (giving a total closer to $1M of federal fund expenses).

Victor: Based on your prior workload analysis, (b) (5) I think it is important to clarify to total federal funds already expended on this topic that had prior approval in this administration.

-Lenny

1.8

FOA Development Standard Operating Procedure
EERE S 540.110
Issued on August 31, 2018

Signature

Bindu Jacob
Acting Director, Project Management Coordination Office
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

ARJUN KRISHNASWAMI – BIOGRAPHY

Arjun Krishnaswami is a Policy Analyst at the Natural Resources Defense Council, an organization of more than 700 scientists, attorneys, advocates, and policy experts that works to safeguard the earth, including the people, plants and animals, and natural systems on which all life depends. In his role at NRDC, Mr. Krishnaswami uses energy system models and other analytical tools to design and support policy solutions that accelerate the clean energy transition, focusing on policy at the federal level and in the interior western states. His work has included analysis of federal power sector policies, modeling the effects of clean energy policies in the western United States, and analysis of the economic impact of clean energy development in the rural Midwest.

Mr. Krishnaswami also has led the development of NRDC's clean energy innovation policy platform. He advocates for expansion of U.S. Department of Energy programs to address emerging problems of the energy system, including grid modernization, increasingly variable power supply, the need for rapid electrification of transportation, buildings, and industrial facilities, and the development of a diverse, well-trained clean energy workforce.

Prior to working at NRDC, Mr. Krishnaswami worked on the energy-water nexus at the World Resources Institute and, before that, built hydrologic models to understand the interactions between climate change, land use, and water resources. He holds a bachelor's degree in environmental systems engineering and a master's in civil and environmental engineering from Stanford University.

Chairman FOSTER. Thank you. And at this point we'll begin our first round of questions. The Chair recognizes himself for 5 minutes.

Dr. Gay, the documents produced pursuant to the Freedom of Information Act request from Democracy Forward contained an email from August 29, 2018, from the then-leader of EERE Cathy Tripodi to a staffer at the DOE Golden Field Office. She said in that email that she was going to meet with you later the same day to discuss language of the new F-O-A, FOA. She emailed a few hours later that she told the—and told the Golden Field Office that "Charlie seems fine with the language." Now, do you recall being asked about the specified alternative language in a meeting on October—on August 29 and reporting back that you were fine with the language?

Dr. GAY. No.

Chairman FOSTER. No, you do not. And so the—this is the two pages, the two pages that appear in your testimony.

Dr. GAY. Yes.

Chairman FOSTER. And I have to say when I read those, I was embarrassed for our government, that those two pages were so far from the level of competence that you saw in the original FOA or in fact in the—we saw when the career staff had done their best to repair the faulty thinking in those two pages. So I understand why you were not fine with that proposal.

Dr. Gay, the documents produced by the Democracy Forward contained an email from July 30 from Ms. Tripodi to political appointees in the Office of Electricity. Now, she reported that the Solar Office has offered to rewrite Topic 1 in the solar FOA. To your knowledge have you or any representative of SETO offered to rewrite Topic 1 at that point?

Dr. GAY. No, sir.

Chairman FOSTER. And so this was something that she was going to personally rewrite herself?

Dr. GAY. I don't know what she had in mind.

Chairman FOSTER. Is it normal practice to have non-technical political appointees rewrite the technical aspects of FOAs?

Dr. GAY. Not in my experience.

Chairman FOSTER. Thank you. Dr. Gay, the documents produced by Democracy Forward contained an email from September 18th, 2018, from Ms. Tripodi to DOE Under Secretary Mark Menezes. In this email she told Mr. Menezes that she had met with EERE staff three times to, quote, "ask them to explain what the words of—in the actual solar FOA in Topic 1 meant" and that staff was unable to explain. Is that your recollection?

Dr. GAY. No, sir.

Chairman FOSTER. Do you recall any confusion on the part of the entities that responded to the FOA? Were they confused by it?

Dr. GAY. It did not appear to be the case.

Chairman FOSTER. So the confusion seems to be limited to Ms. Tripodi. In this email she said EERE staff told her that, quote, "they would issue an amendment and never did and then proceeded to score Topic 1 against direction." Is that your recollection?

Dr. GAY. No, sir.

Chairman FOSTER. Did you or others in EERE commit to issue an amendment to the SETO FOA and that you did not then see through?

Dr. GAY. No, sir.

Chairman FOSTER. Did anyone advise SETO staff not to score the applicants to Topic 1 before SETO had already done so?

Dr. GAY. No, sir.

Chairman FOSTER. Dr. Gay, we understand that Ms. Tripodi apparently drafted the new SETO FOA language herself in collaboration with other political officials in the Office of Electricity and contracting staff from DOE Golden Field Office. Do you believe that to be correct?

Dr. GAY. I don't have evidence to show how that rewrite came to be.

Chairman FOSTER. OK. Well, it's very generous of you to refer to it as a rewrite. Briefly, what is the usual role of the Golden Field Office in preparing a FOA?

Dr. GAY. Field offices are contracting partners, so the Solar Energy Technology Office is based here in Washington, DC, and the Golden Field Office is our partner for contracting purposes. The contracting lead there for most of our work has been Diana Bobo, and the Contract Grants Management Specialist, a gentleman named Clay Pfrangle. So when we issue a FOA, we write the technical part of the FOA here in our office, and when a FOA is issued, there's a very thick compendium of documentation about the mechanics of the review process, the protocols to be followed in submitting applications, and the protocols for review of those applications.

Chairman FOSTER. So the Golden Field Office does not normally contribute to the technical substance of a FOA. Is that——

Dr. GAY. That's correct.

Chairman FOSTER. That is correct. So this was apparently an anomaly to the extent there was technical substance in that two-page rewrite. How unusual is it for a political official to take this on themselves, that a political appointee will just decide to do a complete technical rewrite?

Dr. GAY. I have no idea.

Chairman FOSTER. Have you ever experienced it in the time that you've been with the Department of Energy?

Dr. GAY. No, sir.

Chairman FOSTER. Or heard of it in the past?

Dr. GAY. I have not heard of it before.

Chairman FOSTER. OK. All right. Well, at this point I will yield the rest of my time and recognize the Ranking Member from Texas, Mr. Weber.

Mr. WEBER. Thank you, sir. Dr. Gay, I was looking a little bit of your bio. You started a company called Greenstar?

Dr. GAY. Yes, I did. It's basically a foundation.

Mr. WEBER. Sure. And it says in 1990 you were the President and Chief Operating Officer of Siemens Solar Industries?

Dr. GAY. Yes, sir.

Mr. WEBER. And now, of course if you read it on, you know, Facebook or Wikipedia, you know it's true, right? So it said you were responsible for increasing the sales in 110 countries.

Dr. GAY. That's correct.

Mr. WEBER. And they're Siemens thin solar film. Were you successful at that?

Dr. GAY. I believe that we were. We expanded the business and grew the company. We were able to add manufacturing capacity in both California and the State of Washington.

Mr. WEBER. So would you say the research done by the Department of Energy actually helped move that forward a little bit?

Dr. GAY. Yes, it did. We were actually a recipient of funding for some of our R&D work at Arco Solar and Siemens Solar, the successor company.

Mr. WEBER. And then in 1997 you were on the board, and I was trying to read very quickly here, appointed to the board of the U.S. Department of Energy's National Renewable Energy Laboratory, NREL?

Dr. GAY. I was Director, sir.

Mr. WEBER. Director, OK. Do you feel like you all had some success there?

Dr. GAY. I feel like we did. It was a daunting time because I arrived shortly after the November 1994 election. And our budget had been cut by 1/3, which would have meant the need to lay off—if I did it proportionately—almost 400 employees. But by streamlining our processes, our business practices, I kept the layoff down to about 40 people.

Mr. WEBER. So it can be done with less employees. And refresh my memory. Who was the President back then?

Dr. GAY. This took place—I don't recall actually.

Mr. WEBER. It was Bill Clinton.

Dr. GAY. Clinton.

Mr. WEBER. By way of reminder. Well, it's good to hear that, you know, those agencies can be run, you know, even with less people.

Are you aware that EERE received more applications to the revised assist FOA than the original 129 versus 92?

Dr. GAY. Yes, I'd like to clarify the scope here.

Mr. WEBER. I'm glad you are because that's my next question.

Dr. GAY. The two FOAs, the original FOA included a process called submission of a concept paper. There were 322 concept papers that were submitted, and of those 322, 67 of them were recommended for full proposals. We actually received 92 full proposals, which is the 92 referenced in the original FOA. In the second issuance of the FOA, there was no concept paper process. There was a notice of intent, which had about 220, 225 responses. And of those people who responded to the notice of intent, we received something on the order of 120 proposals. So we actually received more proposals, but it was a different process sequence.

Mr. WEBER. OK. Thank you. You also say that if potential grantees do not think EERE is a reliable partner or doubt that the competitive process is fair, they are less likely to engage with DOE in the future. Did you experience that back in 1997?

Dr. GAY. Repeat that first part if you would.

Mr. WEBER. You say that if potential grantees do not think that EERE is a reliable partner or doubt that the competitive process is fair, they are less likely to engage with DOE in the future. Back

in 1997 you became the Chairman of NREL. Did you experience that then?

Dr. GAY. No, sir, I did not.

Mr. WEBER. No? Is there any proof that this revised FOA gave awards in an unfair process or unfair manner?

Dr. GAY. No, sir.

Mr. WEBER. None that you know of?

Dr. GAY. No.

Mr. WEBER. OK. Are you aware of any institutions or anyone that now refuses to seek DOE grants because they think EERE is, in your opinion, unreliable?

Dr. GAY. No, sir. I don't believe that I used the word unreliable in my own written or oral testimony.

Mr. WEBER. No? What word did you use? Refresh my memory. I was trying to read quickly on two fronts.

Dr. GAY. I didn't reference the projected behavior of somebody else at all.

Mr. WEBER. Yes. OK. Thank you. All right. Well, I'm out of time. I've got other questions, so I yield back. Thank you.

Chairman FOSTER. Thank you. And the Chair will now recognize the gentleman from Virginia, Mr. Beyer.

Mr. BEYER. Mr. Chairman, thank you very much. Thank you all for being with us today.

I—as Mr. Reardon knows, I represent more Federal employees in the Virginia's 8th District than any other Member of Congress. I'm close with Ms. Wexton here, but—and so this is a—the core of this hearing is really important to me and my constituents.

And I've been deeply distressed over the last 3 years about the negative impact this Administration is having on our Federal workforce, especially the belittling of Government employees, the harsh and critical budget cuts to Federal agencies, programs that do untold damage to our Federal workforce. So I just want to use this opportunity to shout out to the wonderful good government we have and the wonderful Federal employees we have who do make us—this wonderful country.

And, by the way, last night's speech was very difficult to listen to, but one of the things I took most objection to was the President's taking credit for the paid maternity and paternity leave for Federal employees. Let's point out that we've been fighting that for years up here without a single Republican cosponsor. And that was a tradeoff made, a compromise made to get his space force, that the only reason we got that was because we strongly negotiated for it, and the return was that he got the space force that he needed.

Mr. Reardon, you mentioned in your testimony higher rates of attrition among existing EERE staff. Assistant Secretary Simmons talked about a 5.8 percent increase in the global satisfaction of EERE employees in the Federal Employee Viewpoint Survey. Can you tell us where they started? With the 5.8 percent was an increase from?

Mr. REARDON. Yes, I'm not certain exactly what the specific number is. I mean, certainly I could get that back to—get back to you on that. But, you know, I think what's important to recognize is, No. 1, who's taking the—who's actually taking the survey. Are frontline employees taking it? What we've seen historically is there

are often times when I am really pushing our members to take the survey, I think it's important for their views to be known. And because frequently frontline employees don't believe anything is really done with the findings in the survey, oftentimes they will refuse to take it. They won't take it. I don't know that that's the case here, but that's what we've seen over the years to a pretty great extent.

Mr. BEYER. What are you saying in terms of attrition at EERE, especially among the GS–14s and 15s?

Mr. REARDON. Well, we're seeing—we're certainly seeing people leave. And I will tell you that I—I think, Congressman Beyer, that it is in large measure due to the way that the agency is treating employees. You know, I think it's—I think we all recognize that when you work at a place and you don't feel valued, that morale goes down. And when morale goes down, what typically happens? People leave.

And so, you know, we've got—I've been hearing from folks, we've been hearing from folks that are letting us know that those who are near retirement, they feel like they are really being pushed out the door. Those who aren't near retirement, they're being moved, transferred out of EERE, or being pushed out. And, you know, news travels quickly when people in a workplace do not feel valued or that they're treated with dignity and respect candidly.

And I—and one quick story is that we have a—we had a former member. He—this particular individual, as I understand it, no longer is alive but was an organ—had an organ transplant. And this individual's doctor had said, you know, it is important that you stay home so, you know, it would be appropriate for you to telework. And in—it took us a great deal of fighting with the agency in order to get them to follow their own telework policy so that this individual could work at home. And that just shouldn't happen.

So I think it's important that employees feel that they're treated fairly, with dignity and respect, and I think we might be able to see people sticking around if that were to be the case.

Mr. BEYER. Mr. Reardon, one of the great fun things is that political leadership, literally the White House, thinks that EERE is too top-heavy, too—the average person is too senior. How do you react to that?

Mr. REARDON. Well, I think, first of all, to the extent that there are a significant number of senior personnel, it seems to me that we've got a lot of folks that have to be highly qualified to do a lot of this work. And so, you know, what I am really concerned about, Congressman, is, you know, we've heard some testimony today and some comments from Members today suggesting that, you know, we need to make certain that there is oversight, that we're paying attention to what work is actually being done by these grant recipients. And the fact is that that is impossible to do properly without an appropriate number of staff. And so that ends up being a significant problem.

Chairman FOSTER. Thank you. And the Chair will now recognize the gentleman from Illinois, Mr. Casten, for 5 minutes.

Mr. CASTEN. Thank you. Thank you, Mr. Chairman. Thank you to the Committee. Excuse me.

What I've seen throughout the investigation of EERE's cancelation and reinstatement of solar power grants is the infiltration of partisan politics into grantmaking, which is designed to be an apolitical process. The political appointee, without consulting with the career public servants with decades of experience administering grant programs like these, pulled the plug on the Topic 1 grants. You know, given this Administration's track record and their hostility to using data to inform decisions from tax policy to climate policy and on, it's hard not to believe that their opposition played a role in that.

And frankly it's also—it's not the only time we've seen this. In this department my staff and I have spoken with public servants who said that since this incident it's become commonplace for political appointees to review FOAs, the funding opportunity announcements, or calls for grant proposals before they're released. And, as we heard in the prior hearing, the office's leadership and particularly the Deputy Assistant Secretaries are increasingly political appointees that are required to be approved by senior staff at a level that was not true in the prior Administration.

Dr. Gay, is it safe for me to paraphrase your testimony to say that you believe that political appointees and their partisan motivations were influencing how FOAs were written and how grants were awarded?

Dr. GAY. I have no special insight to their motivations, sir. The mechanics here are what they are and what I experienced. But the—behind that storyline I don't know how to explain it.

Mr. CASTEN. Do you—would you care to speculate on why you think—I mean, this process that Mr. Foster described of a rigorous, thoughtful FOA becoming a two-page memo—why—what do you think drove that?

Dr. GAY. I'm not one to speculate, sir. I don't know.

Mr. CASTEN. OK. I appreciate your willingness to stick to facts that we understand.

Mr. Reardon, you mentioned in your testimony that the career public servants that comprise your union membership believe their expertise is being disregarded by this Administration. Have your members spoken about partisan motivations encroaching on grantmaking and similar decisionmaking?

Mr. REARDON. I've not personally heard anything about that issue.

Mr. CASTEN. OK. Mr. Krishnaswami, in your written testimony you explicitly called the delay in the solar power grants politically motivated. Do you care to speak to what you meant by that and——

Mr. KRISHNASWAMI. Thank you, Congressman. I would note two things here. One is that leading up to the solar FOA, the funding opportunity had already been through rigorous review both by the program staff, as well as by—through a new political process that was instated in 2017 by the Administration to vet the funding opportunities. So the funding opportunity had been through that entire process, and then days before it was announced, you know, was canceled by a different political appointee who was in an acting position, as we've heard, and actually, it was initially approved by Mr. Simmons before that. So that points to the fact that there was

a circumventing of the process that was already established to cancel this funding opportunity.

The second thing I'd point out is that looking at the data that we presented, as well as the cancelation of this funding opportunity, it aligns with what the Administration has publicly proposed in its budget request, cutting the Solar Energy Office, cutting the other programs within EERE, as well as rescinding prior—you know, prior funds from earlier years. So it's hard for us not to draw the connection between those explicit proposals and the actions that we've seen.

Mr. CASTEN. Final question just for any of you who'd care to answer, I spent 16 years in the clean-energy industry. I sold about 80 clean-power projects and with one exception I never sold it to anybody because they cared about climate change. I did. They just wanted to save money because if you're generating energy with less raw energy input, you tend to have more cash in your wallet at the end of the day.

I'm trying to understand why an Administration that on its face they like to talk about how much they love capitalism and markets. Can you speculate, any of you, on why it is that they seem to be working so hard to block the deployment of technologies that would make us wealthier?

Mr. KRISHNASWAMI. Thank you, Congressman. I would just add that these actions align with other actions that the Administration has taken to limit clean-energy development and prevent clean-energy development despite the well-proven economic benefits and savings that clean energy provides to the public.

Mr. CASTEN. Thank you. I yield back.

Mrs. FLETCHER [presiding]. Thank you, Mr. Casten.

I will now recognize myself for 5 minutes. And thank all of the witnesses for being here for this panel this morning.

My first question, Dr. Gay, is addressed to you. DOE told us that they needed to cancel the original Topic 1 solar funding opportunity announcement, or FOA, because the Solar Energy Technologies Office didn't adequately consider grid integration concerns. But I'm looking at the original FOA now, and Topic 1 is titled "Advanced Solar Systems Integration." It describes, quote, "SETO research priorities and the seamless integration of high penetrations of solar energy onto the Nation's electricity grid." So would you agree with DOE's assertions to Congress, the public, and hundreds of applicants from companies and universities across the country that the original FOA did not sufficiently address grid integration issues?

Dr. GAY. I would not agree, and to reinforce that, I want to reinforce the message of how much work we did to collaborate with the Office of Electricity. We made modifications to the FOA in response to their recommendations for what wording we used in the FOA. We carried out reviews all the way back to October of 2017 of what our plans were. I personally met with staff in the Office of Electricity to preview our plans, to cover the scope of anticipated work, to solicit their feedback on what we had and how we could better optimize together what we were looking to do.

So the facts here are that there was a great deal of collaboration, especially I wanted to highlight the contributions of two people in

the Office of Electricity who did a terrific job of helping build bridges here. One is the Deputy Assistant Secretary Michael Pesin and one is a gentleman named Gil Bindewald. We also collaborated with the cybersecurity folks at the beginning of the FOA period. It was with Carol Hawk, who was in the Office of Electricity responsible for cybersecurity of the grid. She moved into the CESER office, the Cyber Energy Reliability Office. And we continued to have her involved, along with representatives from the Office of Electricity in the reviews of the FOA, in the scoring of the FOA, and the selection—down-selection process that were part of the Federal Consensus Review Panel.

Mrs. FLETCHER. Thank you. I think in your answer you anticipated a couple of my other questions, but I do want to follow up on sort of two things related to your testimony about your time there as the Director and the work that you did with the Office of Electricity. So I guess sort of two thoughts. One, based on your time and experience, can you provide any insights into the origin of the claim that there wasn't sufficient research if you have any? And, two, kind of with that in mind, is it your opinion that there is any reasonable justification for canceling the original FOA?

Dr. GAY. I am not aware of any conversations that took place before the cancelation where there was an engagement to discuss what a rewrite would entail. The rationale for canceling, as I pointed out, were twofold, one that we had not done adequate collaboration with the Office of Electricity, which I think I've spoken to well enough here. And the other was that the writing was not understandable. Part of the understandable nature of the writing I found befuddling because the document I was handed to replace the original FOA with was itself not understandable. It called for putting distributed energy resources into the transmission system. Distributed energy resources are in the distribution system, and they are operated separately from the transmission system. So the document that I was given to form the foundation of reissuing was not technically understandable.

Mrs. FLETCHER. And as a follow-up to that, what was the origin of that document you were—who gave it to you?

Dr. GAY. It was handed to me by acting EE1 Tripodi.

Mrs. FLETCHER. And, I'm sorry, did I let you finish the remainder of your answer there on whether there was any reasonable justification? I think you've identified the two reasons that were given, and it's my understanding that you don't think that those reasons are sufficient. Is that a fair takeaway?

Dr. GAY. Yes, it is, and it's reinforced by the fact that the rewrite had to be rewritten.

Mrs. FLETCHER. Thank you. I only have a short—actually, I've gone over my time, so if we do a second round of questions, I have another question for you. But otherwise, I will yield back, and I will recognize Ms. Bonamici for 5 minutes. Thank you.

Ms. BONAMICI. Thank you to the Chair, and thank you to all the witnesses for being here.

I represent a district in northwest Oregon, and I know at home in the Northwest but also across the country and around the globe people are demanding comprehensive action to reduce greenhouse gas emissions to address the climate crisis. It's such a critical issue.

And to meaningfully do that, to reduce emissions, we need to accelerate our transition, adjust transition to 100 percent clean-energy economy, and that is going to take robust investments in EERE.

And even as, Mr. Reardon, your testimony pointed out, over the last 12 years the investments in EERE, $20 billion, has yielded a net economic benefit of $230 billion. So going back to Mr. Casten's point about these are good investments, and that's why we need to be making them.

Mr. Krishnaswami, we appreciate the NRDC's continued efforts to provide oversight and transparency on the DOE's attempts to sideline congressional intent in allocating the EERE and ARPA-E funds. And in your testimony you noted that EERE ended fiscal year 2019 with about 4 percent of the office's funds unallocated and 18 percent unspent. And ARPA-E ended with 48 to 68 percent of its funds unallocated and up to 91 percent unspent. How do these carryover amounts compare to previous Administrations? And how has the delayed distribution of those funds affected our Nation's capabilities to effectively reduce greenhouse gas emissions and transition to a clean-energy economy? When we look at the return we get on those investments, what has that meant to our energy future?

Mr. KRISHNASWAMI. Thank you, Congresswoman. I'd note two points. The first is that when we looked back at this—the—at this analysis, we went back several years in the prior Administration, and we found that consistently both EERE and ARPA-E were putting out the announcements of funding opportunities later in the year and actually awarding the—choosing the selections also later in the year or after the fiscal year had ended. So especially over the last 2 years ARPA-E and EERE were behind where we were under the prior Administration.

And to your broader question, the second point is really that we know that these programs, as has been stated several times, are really beneficial in terms of the return on taxpayer investment to the public. We also know that they've already made a dent in the climate challenge and that they need to be much, much larger to actually match the scale of the climate crisis. So any delays in getting those money—that money to researchers and businesses or preventing it from getting to the public is really a delay in those benefits from reaching people and a delay in combating this urgent climate crisis.

Ms. BONAMICI. Absolutely. And I'll note I just—I came—prior to this hearing, this morning we had a hearing in the Select Committee on the Climate Crisis where we were talking about the health effects of the climate crisis. And former EPA Administrator McCarthy was there. We were talking about the social cost of carbon and the healthcare costs that are also so important to consider. So it's—we need to consider all those aspects as well.

So I wanted to also ask again, Mr. Krishnaswami and Mr. Reardon. I share your concerns that given the significant backlog of unobligated funds within EERE, the Department has not hired more staff to help process more FOAs since the Federal hiring freeze was lifted. So in your opinion what—what's delaying the Department? Mr. Gay, you might want to weigh in on this as well. What's delaying the Department in hiring more staff? And as we look to the President's budget proposal next week, how will the Ad-

ministration respond to the 2020 report language that—about the Department reaching a staffing level of 650 FTEs this year?

Mr. KRISHNASWAMI. Thank you. I would note that, you know, we don't know exactly what has changed within the hiring process at DOE or what is causing each individual holdup in announcing positions or filling the positions. But we do see the trends in the data, which show that the number of staff have decreased and particularly with increasing budgets. So really I think it's really important to understand and identify what those holdups are, what has changed in the process of hiring. And we encourage you to work with the DOE to determine that, identify it, and change it so that EERE can hire faster.

Ms. BONAMICI. And thank you. I have a little bit of time left. Mr. Reardon and Mr.—Dr. Gay?

Mr. REARDON. Yeah, I'd be happy to jump in there. I have no idea what is—what's causing the holdup. Clearly, there is one. Clearly the EERE is far too understaffed. The point that I think I would add to other things I've already said is that, you know, we've talked about not having a blank check to these companies that have—that are receiving these grant funds. One way to make certain that we are not in fact giving a blank check is to ensure that we have enough staff to be out there——

Ms. BONAMICI. Absolutely.

Mr. REARDON [continuing]. Tracking and providing the absolutely necessary oversight that the American people deserve.

Ms. BONAMICI. Yes. And the light turned red, but Dr. Gay, very briefly, do you have a couple words to——

Dr. GAY. Yes. This is about delegation of authority, that being able to delegate the responsibility and hold people accountable. During the course of the past several years, the hurdle has raised rather than stayed where it was or been lowered in order to have the authority to carry out the hiring.

Ms. BONAMICI. Thank you. I yield back.

Mrs. FLETCHER. Thank you. I'd now like to recognize Representative Wexton for 5 minutes.

Ms. WEXTON. Thank you, Madam Chair. And thank you to the witnesses for joining us today. This has been very informative. Your testimonies have really shed a light on the important work that EERE is doing for America and our use of renewables.

This—as we've heard, this use of new technology helps drop the cost of renewables and provides greater opportunity to adapt them to these technologies and drive job growth. In Virginia, for example, in my home State growth in the solar sector grew by 9 percent, job growth did in 2018. Now, it could have been better, but that's still pretty good.

Now, it's alarming to hear the extent to which congressionally appropriated dollars for growth in this industry have not been spent and that there are great opportunities that are just languishing. And it's very disturbing to hear about the impact on EERE's workforce.

You know, Mr. Reardon, you said in your testimony something that was very important about Federal workers and career civil servants, that they do this work out of a desire to serve their country. And they are experts in the field, and they get paid a lot less

than they do in the private sector, but they do this work because they believe in the mission of the agency, and they love it. And so I'd like to talk a little bit about what they actually do at the EERE.

Dr. Gay, can you elaborate a little bit on what it means to actually oversee an EERE grant? What do the workers do in those cases on a day-to-day basis?

Dr. GAY. Typically, there's a process for follow-up with each of the awardees for reviewing their process. As part of their proposals that are submitted, they have to submit milestones and goals and a timeline. In the office we review the progress against those milestones, and if things seem to veer from the course that was projected, we collaborate with the awardee on what actions to take, whether it's appropriate to pivot, whether it's appropriate for them to add more emphasis in a different way. So there's a lot of follow-through with the awardees to assure that the intention of the original funding from Congress is maintained and it continues throughout the period of execution of that award.

Ms. WEXTON. So it's a part of being good stewards of the Federal resources, of the taxpayer dollars and making sure that we get results for our investment. Is that correct?

Dr. GAY. Yes. I'm a taxpayer, too, and I care about what happens here. And I especially care about clean energy. So it's a combination of the business background that I bring to follow that structure, to follow the roadmaps and the processes so that we execute on schedule, on time, and on budget.

During the time that I ran the office, we actually——

Ms. WEXTON. And, I'm sorry, I'm going to reclaim my time because I'm running out. But with fewer employees doing this important work, there's going to be some impacts to their ability to perform their jobs. Is that correct, Mr. Reardon?

Mr. REARDON. That is correct. And——

Ms. WEXTON. And are you hearing concerns from your members about how their workload is suffering given the—or how the work product is suffering given the workload that they are required to complete?

Mr. REARDON. Absolutely, we are.

Ms. WEXTON. Are there—do you have any data about personnel complaints that you may have received for—from DOE or from Department of Energy because of being overwhelmed or anything like that?

Mr. REARDON. Well, clearly, we have ongoing conversations with our members, so we're hearing all the time about that. In terms of specific data, I don't have that today. But I can assure you there is a great deal of concern, and the morale is pretty low.

Ms. WEXTON. And have you heard of DOE employees taking on obligations that they didn't have—that they didn't have in the past or that weren't necessarily parts of their general job description?

Mr. REARDON. Well, what I've primarily heard is where employees are having to take on a much bigger portfolio. And, as a result, they're not able to, you know, do the work that they think is necessary to provide proper oversight.

Ms. WEXTON. OK. Dr. Gay, do you have anything to add to the employee oversight issue?

Dr. GAY. I care a lot about the workload that the employees carry, and our budgets have been increasing as time has gone by. The staffing level has been shrinking. There's normal attrition maybe on the order of 6 percent per year. So not even being able to backfill for attrition puts more burden on the existing workforce.

Ms. WEXTON. Well, Doctor, we heard from Assistant Secretary Simmons earlier today, and he said that hiring new employees was a top priority for him. But clearly, that seems to be in conflict with the facts. And thank you. I yield back.

Mrs. FLETCHER. Thank you. I'll now recognize Mr. Lamb for 5 minutes.

Mr. LAMB. Thank you, Madam Chair. Thank you to all three of you for being with us this morning and sticking out this kind of long hearing.

Mr. Reardon, you mentioned in your testimony that when your employees are driven out of public service, they have very competitive private-sector opportunities often in places that are willing to play to pay them more and treat them with more dignity and respect. Could you state a little bit more about that? I don't know how specific you can get, but what types of jobs are they leaving the government for?

Mr. REARDON. Well, I don't know specifically with regard to folks from EERE. What I can tell you is NTEU represents employees in 33 different Federal agencies, and there is no question but that—whether they're from the Internal Revenue Service or FDIC (Federal Deposit Insurance Corporation) or wherever, they have the ability to go out and earn far larger paychecks in the private sector.

What I can tell you is that, as I said, we represent employees in 33 agencies. I talk to employees across the Federal Government all the time. And so what is it—if they can get a bigger paycheck somewhere else, what is it that drives them to come to Federal service or drives them to stay in Federal service? And I'll tell you what it is. It is to serve this country. They believe in the mission. They believe in this country, and they believe in serving the American taxpayer. That's what keeps them here. That's what brings them here in the first place.

Mr. LAMB. Yes. I think that's absolutely right. That's been my experience with public servants across agencies as well. I think in this case it's even more glaring because we make the comparison all the time between our race for carbon-free, affordable energy to the space race and to the Manhattan Project. And I think it's a fair analogy. You can tell me if you agree. But I think this is a fair analogy to if President Eisenhower or President Kennedy had chased out NASA (National Aeronautics and Space Administration) employees after Sputnik or if, you know, the folks who were working on the Manhattan Project all of a sudden were getting run out the door, you know, as we got further and further along during World War II.

I think that the threat of losing this race to a peer competitor like China is that real. I mean, we know the investments that they're making. They are all State-led and State-directed, and they are making themselves the sole employer in their country. They're not having this same problem. Would you agree?

Mr. REARDON. Well, I don't want to pretend that I'm a scientist or that I'm an expert in this field. It sounds right to me, but I'll leave the—I'll leave some of that to some of the experts.

Mr. LAMB. Thanks.

Mr. REARDON. I am concerned, though, anytime I think we're talking about important science like this, if we're leaving it whether countries to kind of come in and fill the void, as an American taxpayer, that would concern me.

Mr. LAMB. And again, if you're someone who doesn't believe that the Government has an important role to play in all of this, you know, maybe some of this makes sense. But we—history does not support that. I mean, history supports that the role of the Federal Government is essential and that it has helped distinguish us from our peer competitors in the past and will do so again if we do it right.

Mr. Krishnaswami, thank you for the information that you've added to this debate today. I think apart from the workforce issues that we're, you know, tragically having, the fact that we are not even spending the research and grant dollars that we're allocating is even more alarming particularly because Members in both parties on this Committee, full Committee have supported increased funding for ARPA-E. I think was actually one of the great bipartisan success stories of 2019 was that we were able to reach an agreement across the aisle and in sort of old-fashioned way to increase the budget for ARPA-E for the first time since it was created after 2008.

Any insight or explanations that you can see as to why—I mean, if these numbers you're giving us are accurate, the vast bulk of their funding in 2018 and 2019 just wasn't spent?

Mr. KRISHNASWAMI. Thank you, Congressman. So I'd note two things. One is that the analysis that I presented were we conducted them at the end of the fiscal year, right? So what we're looking at was by the time the fiscal year was over how much has each—has ARPA-E or EERE actually allocated announced in funding opportunities and then spent? And we found that at the end of last fiscal year ARPA-E had allocated some of its money but far less than the total, so it had announced funding opportunities. And then based on the publicly available announcements had not actually—had spent very little of that money. Since then, I believe that they have spent some of that money, but we were looking at by the end of the fiscal year——

Mr. LAMB. Right. There's a sense of urgency that they need to be operating with here given the scale of the problem but also given the number of people who want to participate in being part of the solution. I mean, part of the reason we voted again across party lines to support the budget increase for this program is that they told us they were only able to accept like 1 out of every 100 applications they were getting. There was massive demand to be part of this program, and we needed to give them more resources in order to be able to take gambles essentially on a higher number of good ideas. So thank you for bringing that information to light. Everybody needs to know about it, especially Members of this Committee, and hopefully we can take steps to try to force some accountability from the Administration.

And, Madam Chair, I yield back.

Mrs. FLETCHER. Thank you very much. And I thank you, too, for the issues that you've raised and brought to the Committee's attention today and your testimony. I want to thank you all for being here today.

Before I bring the hearing to a close, I would like to mention that the record will be open for 2 weeks for additional statements from Members and for any additional questions the Committee may ask of the witnesses. I know I mentioned early on that I had a few more questions, so I'll be submitting some questions for the record. And we'll look forward to seeing your responses.

At this point in time the witnesses are excused and the hearing is adjourned.

[Whereupon, at 12:15 p.m., the Subcommittees were adjourned.]

Appendix I

Answers to Post-Hearing Questions

ANSWERS TO POST-HEARING QUESTIONS

Responses by Mr. Daniel Simmons

U.S. House Committee on Science, Space, and Technology Subcommittee on Investigations and Oversight and Subcommittee on Energy
February 5, 2020: "Management and Spending Challenges within The Department of Energy's Office of Energy Efficiency and Renewable Energy
Questions for the Record Submitted to Daniel Simmons, Assistant Secretary for the Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy

QUESTIONS SUBMITTED BY REPRESENTATIVE BILL FOSTER, CHAIRMAN, SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

Q1. The 2007 Energy Independence and Security Act (EISA) requires all Federal agencies to conduct evaluations of buildings within their jurisdictions at least once every four years to identify energy savings opportunities. (42 USC 8253). As required by the law, the results of these evaluations are forwarded to DOE and maintained in a publicly available database. We have several questions concerning the information contained in the database:

Q1a. The EISA Section 432 database maintained by EERE's FEMP Program shows the Department of Energy has evaluated only 85.7 percent (as of Feb 12, 2020) of its covered facilities for energy savings opportunities. Can you explain why DOE has not complied with the 2007 law, which requires 100 percent of covered facilities to be evaluated every four years?

A1a. The Department of Energy's (DOE) Compliance Tracking System (CTS) is the database DOE uses for Section 432 compliance. The data cited above is based on our last upload from June 2019 and does not accurately reflect current status. As of February 24, 2020 DOE is at 97 percent compliance with 41 out of 42 covered facilities (sites) compliant. We are currently working with the remaining site to finalize their evaluations.

Q1b. The EISA Section 432 database shows that audits of DOE facilities have identified over one thousand "energy conservation measures" (ECMs) that could be identified to save energy and taxpayer dollars. Assuming that there are not sufficient appropriated dollars to implement all of the life-cycle cost-effective ECMs, please describe efforts that DOE is undertaking to encourage its National Laboratories and other sites to use tools such as performance contracting to capture these savings.

A1b. DOE is working to improve its ECM data to include only relevant life-cycle cost effective measures. Some of the ECMs listed in the CTS are outdated and no longer valid. Some others are not actually life-cycle cost effective. Of the 1,359 identified ECMs listed, 367 have been cancelled and 452 have no cost data leaving 540 projects as a possibility with an estimated cost of $583 million. DOE encourages the use of performance contracts as an option to execute ECMs due to the limited appropriated

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dollars for implementation. DOE provides training sessions on best practices to ensure that contracting and program staff have a solid understanding of these instruments.

Q1c. The EISA Section 432 database appears to show that Federal agencies have implemented about 16,100 ECMs since the law was implemented in 2008. The database also appears to show more than 63,000 ECMs that have been reported to DOE but not yet implemented by the various agencies. Based on this data, is it correct to conclude that there is a huge untapped opportunity to implement ECMs that will both save energy and taxpayer dollars?

A1c. Reporting on implemented ECMs in covered facilities is not consistent across Federal agencies, with significant under-reporting of implemented projects by some agencies. Separately-reported aggregated project investment awarded by agencies for the fiscal years 2010 through 2018 amounted to approximately $19 billion (in current dollars)..[1] Only $5.2 billion in project implementation costs awarded in EISA covered facilities were reported by agencies in the EISA CTS for the same period.

This under-reporting makes it difficult to definitively assess the size and scope of the "opportunity" to implement cost-effective ECMs in Federal covered facilities.

Q2. Mr. Simmons, you indicated during the hearing that DOE extended 20 offers for employment to candidates from the July 2019 job fair. How many employees are now on board within EERE as a result of those offers?

A1. As a result of the July 2019 job fair, the Office of Energy Efficiency and Renewable Energy (EERE) extended over 20 job offers to candidates interested in working with EERE. As of March 3, 2020, eight new employees are on-board within EERE and six new employees have start dates planned for March or April. Two additional candidates have received tentative job offers and are in the security clearance process.

[1] Federal agency Energy Management Data Reports, Table G-1 Investment in Energy Efficiency and Renewable Energy, https://ctsedwweb.ee.doe.gov/Annual/Report/Report.aspx.

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Six candidates declined the offer, and of those, five alternate selections have already been made. One of the five alternative candidates has start date in April and the remaining four candidates are pending final acceptance of the offer.

Q3. Mr. Simmons, you indicated there are over 70 EERE positions "currently in process" that have been signed through all approval levels of the Department. Please share more detail on the status of these 70 positions.

A3. At the time of the hearing, EERE had over 70 approved positions either awaiting initiation with the DOE Human Capital (HC) or moving through the HC process.

As of March 10, 2020, 21 candidates have been selected, of which 10 candidates are pending either the results of their security review or their start date; nine are in salary and incentives negotiation; and two will have tentative offers extended by HC shortly.

The remaining 56 approved positions include:

- 21 positions are pending position classification or announcement on USAJOBS;
- 5 positions have been posted, and HC is working to develop a certificate of eligible candidates to send to the selection official; and
- 30 are pending selection, which includes positions approved for direct hire selection.

Q4. You committed during the hearing to consider leveraging the Presidential Management Fellows program in order to move more staff into service at EERE. Please share the following:

Q4a. How many PMFs does EERE have in place today?

A4a. As of March 4, 2020, EERE has no Presidential Management Fellows (PMFs) in place.

Q4b. How many PMFs did EERE have in January 2017?

A4b. In January 2017, EERE had 11 PMFs.

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Q4c. How many PMFs have completed fellowships with EERE between January 2017 and today?

A4c. Since January 2017, all 11 PMFs have completed their EERE fellowships.

Q4ci. Of these, how many have been able to convert to permanent federal positions within EERE?

A4ci. Of the 11 PMFs that EERE had in January, 10 have been converted to permanent federal positions within EERE or elsewhere within DOE. The remaining PMF was converted into a 4-year term position with National Nuclear Security Administration (NNSA).

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QUESTIONS SUBMITTED BY REPRESENTATIVE LIZZIE FLETCHER, CHAIRMAN, SUBCOMMITTEE ON ENERGY

Q1. The Committee is aware that you were not in your formal Assistant Secretary role at the time the 2018 solar funding opportunity was cancelled and were not personally a part of that decision. That said, a big part of our concern was how career staff were sidelined during that process.

Q1a. Can you affirm whether you as the leader of EERE are committed to keeping career program staff engaged at all steps of these processes in the future?

A1a. Yes.

Q1b. In the last three years, have any political appointees at EERE ever been involved in the merit review process for funding proposals in response to DOE-issued FOAs? If so, please describe specifically when and how.

A1b. I am not aware of any instances where political appointees have been involved in the merit review process for funding proposals to DOE-issued funding opportunity announcements (FOAs).

Q1c. In the last three years, have any political appointees at EERE ever been involved in the award selection process after the merit review process is completed? If so, please describe specifically when and how.

A1c. Program leadership is regularly briefed on the results of a FOA merit review.

Q2. The FY20 funding package for DOE came with instructions from Congressional Appropriators to "maintain a diverse portfolio of early-, mid-, and late-stage research, development and market transformation activities in each applied energy R&D program office."

Q2a. Has Department leadership given directions, either formal or informal, to you or specific EERE programs to steer funding away from mid- or late-stage R&D in favor of early-stage?

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A2a. On June 21, 2018, the Administration released the Delivering Government Solutions in the 21st Century Organization Design Principles and Recommendations document, which proposes that the DOE applied energy programs "…emphasize sector and system-level outcomes and ensure a robust, systemic focus on early-stage R&D, where the Federal role is strongest. The proposal would also integrate into the blended organization some positive elements of the ARPA-E model, such as coordination with industry and ability to incorporate cross-cutting research into program outcomes."

On August 30, 2019, the Office of Management and Budget (OMB) released the Fiscal Year (FY) 2021 Administration Research and Development Budget Priorities, which included in part the following: "Departments and agencies should invest in early-stage, innovative research and technologies that show promise for harnessing American energy resources safely and efficiently, inclusive of nuclear, renewable, and fossil energy. Federally funded energy R&D should continue to reflect an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy production and storage technologies, including supporting user facilities that can improve multisector collaboration."

In alignment with the OMB guidance, the FY 2021 Budget Request focuses DOE resources toward early-stage R&D and reflects an increased reliance on the private sector to fund later-stage research, development, commercialization, and deployment of energy technologies. This Budget Request emphasizes energy technologies best positioned to support American energy independence and resilience in the near- to mid-term.

Q2b. Can you confirm that EERE is committed to supporting R&D at all Technology Readiness Levels, as instructed by Congress?

A2b. EERE executes appropriated funds in accordance with the law and in consideration of Administration priorities.

U.S. House Committee on Science, Space, and Technology Subcommittee on Investigations and Oversight and Subcommittee on Energy
February 5, 2020: "Management and Spending Challenges within The Department of Energy's Office of Energy Efficiency and Renewable Energy
Questions for the Record Submitted to Daniel Simmons, Assistant Secretary for the Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy

QUESTIONS SUBMITTED BY REPRESENTATIVE SEAN CASTEN SUBCOMMITTEE ON ENERGY

Q1. Mr. Simmons, you indicated during the hearing that you were not sure which types of EERE position descriptions and hiring decisions require a higher-order approval above the Assistant Secretary level. Please provide documentation on the various approvals that are required to issue both position descriptions and offers of employment within EERE according to employment type (GS-level, Senior Executive Service, Schedule C, etc.).

A1. EERE follows the Department's Managed Hiring Process that has been in place since January 2017 for all staffing action approvals. This includes DOE senior leadership review of some recruitment requests to help ensure that offices across the Department are managing an appropriate balance of senior and junior-level positions and support both professional growth opportunities and succession planning. Leadership reviews enable a consistent approach to staffing throughout the entire Department.

Under Managed Hiring Process guidance, certain General Schedule (GS) actions must be approved by the Secretary. GS actions that require Secretarial approval via the Managed Hiring Process include:

- The establishment and recruitment of all new positions at any grade level; and
- The backfill of positions at the GS-14 and GS-15 levels.

Also, Secretarial approval is required for Senior Executive Service (SES) hiring actions.

Given their special requirements and per longstanding Departmental practice, SES, Senior Level (SL), Scientific Professional (ST), and excepted service (EJ/EK) positions must also undergo review by the Department's Executive Resources Board and Office of Corporate Executive Management within DOE-Human Capital (DOE-HC).

For additional information, please see the attached DOE Managed Hiring Process Implementation Guidance.

U.S. House Committee on Science, Space, and Technology Subcommittee on Investigations and Oversight and Subcommittee on Energy
February 5, 2020: "Management and Spending Challenges within The Department of Energy's Office of Energy Efficiency and Renewable Energy
Questions for the Record Submitted to Daniel Simmons, Assistant Secretary for the Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy

Q2. Please provide a writeup of EERE's standard operating procedure for hiring, from developing, approving and posting position descriptions, through notifying selecting applicants and onboarding them into their new positions.

A2. Approval for positions are routed internally to EERE, then through the Department's Managed Hiring Process, as required. Following approval, EERE adheres to DOE-HC's hiring process, from developing the position description through onboarding. Like other DOE offices, EERE works closely with DOE-HC on the development of vacancy announcements to recruit new Federal employees. The collaborative effort involves hiring managers as well as DOE-HC experts to include classifiers and staffing specialists. The DOE-HC experts, along with the hiring manager, develop and approve position descriptions required to open a vacancy announcement. DOE-HC identifies any special authorities to recruit staff quickly (e.g., veteran's preference and direct hire authority for technical positions) and ensures that all vacancy announcements adhere to Federal requirements.

Once a vacancy announcement closes, DOE-HC staffing specialists perform a qualifications review of all applicants consistent with U.S. Office of Personnel Management guidelines. The ultimate decision regarding candidate selection is made by Directors and Supervisors in each Departmental office. Recruitment incentives are made available for positions that are difficult to fill. These can include advance-in-hire, which allows a superior external candidate to be placed at a higher step than step 1, and service leave credit to candidates who request them. These are approved in accordance with available funding for staff salaries and benefits. After selection, DOE-HC forwards the candidates' information to the Personnel Security Office, which is located in another Departmental office, where each candidate undergoes a security review in accordance with Federal and Departmental requirements. The time for completion of this review varies depending on the type of position, security risk, etc. Once the security

requirements are met, DOE-HC provides a final job offer and Entrance on Duty date to the selectee.

For additional information, please see the attached Manager Guide describing the recruitment process and the DOE Policy Memorandum regarding use of the Direct Hire Authorities available to the Department.

Department of Energy
Washington, DC 20585

April 16, 2019

MEMORANDUM FOR HEADS OF DEPARTMENTAL ELEMENTS

FROM: CANDICE ROBERTSON Candice Brunnell Robertson
CHIEF HUMAN CAPITAL OFFICER

SUBJECT: Managed Hiring Process - Updated Implementation Guidance and Procedures

On April 14, 2017, the Office of the Chief Human Capital Officer (HC) issued *Post-Hiring Freeze Implementation Guidance and Procedures*, providing detailed instructions for a strategically managed hiring process for the Department of Energy (DOE). This memorandum supersedes this earlier guidance and updates several of the procedures associated with the managed hiring process. Consistent with the earlier guidance, during the managed hiring process, no vacant position may be filled from external sources and no new position may be created, except in limited circumstances as set forth in this guidance. Changes to the previously issued guidance include eliminating guidance related to actions impacted by the 2017 hiring freeze, rescinding the exemption for Pathways Program conversions, modifying approval requirements for details into and outside of the Department, clarifying various ambiguous points, and updating the form to be used for all required personnel actions.

Applicability

The procedures identified in this memorandum apply to all Departmental Elements, with the exception of the Office of the Inspector General. This guidance is applicable to all DOE positions, regardless of the sources of operational and programmatic funding, and applies to all types of federal civilian appointments, regardless of the length of the appointment. In addition, officials identified as approval authorities below must follow the processes identified in this memorandum, where applicable.

Officials with Approval Authority

Except as described below, the Administrator of the National Nuclear Security Administration (NNSA), the Administrators of the Power Marketing Administrations (PMAs), and the Director, Office of Intelligence and Counterintelligence (hereinafter referred to as Approving Authorities) have the authority to determine whether non-Senior Executive Service (SES) positions and selections in their respective organizations fall within the parameters outlined in this guidance. These officials must justify in writing their decisions and forward the justifications to HC for routing to the Office of the Secretary.

For this purpose, the Approving Authorities must document and comply with the justification package requirements outlined in this memorandum. For SES positions, the Approving Authorities must follow the guidance provided in this memorandum, unless otherwise noted.

Definitions

For the purposes of this guidance, the following definitions shall be used when determining whether an approval request should be considered a backfill of an existing position or the creation of a new position.

1. Backfill Action: The filling of a position that has been vacant for less than one year, has no significant changes to major duties, and is not increasing in grade.

2. New Position: A position that meets at least *one* of the following criteria:

    a. Has never been encumbered within the organization;

    b. Has not been encumbered for over one year;

    c. Has significant changes to major duties;

    d. Is increasing in grade; or

    e. Is changing supervisory status.

Personnel Action Approval Process

A. ***Approval Process***

For all positions requiring Office of the Secretary approval, the requesting Departmental Element must submit an approval request using Attachment 1, *Managed Hiring Process Form – Request for Approval of Personnel Action* (hereinafter referred to as Managed Hiring Process Form).

1. As outlined in the Managed Hiring Process Form, the approval request must include:

    a. A brief description of the position requested;

    b. An explanation of how the position is critical to accomplishing the mission or the legal requirements of the Departmental Element;

    c. An explanation of how the position fits within the Departmental Element's current and anticipated funding levels; and

    d. An explanation of staffing solutions for filling the position.

2. The request must be approved by the Head of the Departmental Element and the appropriate Under Secretary, as applicable.

3. Once approved, the Managed Hiring Process Form must be submitted to the Departmental Element's Human Resources (HR) Business Partner or Executive Consultant, as appropriate, for HC review and routing to the Office of the Secretary for approval.

B. ***Actions that Require Secretary Approval***

Approval from the Office of the Secretary is required for the actions described in this section before a Departmental Element may proceed. Except where noted, the authority to approve these actions is not delegated to the Approving Authorities. The completed Managed Hiring Process Form must be submitted along with the standard Executive Resources Board (ERB) package in all situations. In accordance with standard procedures, ERB approval or Office of Corporate Executive Management (OCEM) review is still required for any executive action that normally involves ERB approval or OCEM review prior to requesting Office of the Secretary approval, or prior to effecting if approved by an Approving Authority consistent with the exception identified. The Office of the Secretary must be notified, via HC, when actions are taken under the identified exception.

1. Creation of new SES positions.

2. Backfilling of existing SES positions via external recruitment (i.e., advertising on USAJobs to applicants outside of DOE or transfers of SES members from other agencies) or internal reassignment.

    a. Exception: With advanced concurrence by the Chief Human Capital Officer (CHCO), the NNSA Administrator may backfill existing non incumbent-only SES positions via external recruitment or internal reassignment without Office of the Secretary approval.

3. External details of DOE employees to the White House, Executive Office of the President, and Congress, regardless of length or reimbursement.

C. ***Actions that Require Secretary or Approving Authority Approval***

The Office of the Secretary or appropriate Approving Authority must approve the actions described below before a Departmental Element may proceed. The completed Managed Hiring Process Form must be submitted, along with the standard ERB package for all executive actions. Prior to requesting Office of the Secretary approval or prior to effecting if approved by an appropriate Approving Authority, ERB approval or OCEM review is required for any executive action that normally involves ERB approval or OCEM review. Once both approvals are received, advertisement or reallocation can occur.

1. Backfilling of existing positions via external fill.

Actions that Require Secretary or Approving Authority Approval, cont'd

a. Approval is required prior to advertising any position with a full performance level at the GS-14 or above (or equivalent) level externally.

b. In accordance with standard procedures, requests to backfill existing non-SES executive positions (SL/ST, EJ/EK) require OCEM review.

2. Creation of new positions.

   a. Approval is required prior to establishing a new position at any grade level, regardless of whether the position is filled with an internal or external candidate.

   b. In accordance with standard procedures, requests to establish new non-SES executive positions (SL/ST, EJ/EK) require ERB approval.

3. Intergovernmental Personnel Act (IPA) agreements for (1) individuals on assignment to DOE from eligible non-Federal entities and (2) DOE employees who are on IPA agreements outside of DOE.

4. Extensions of term and temporary appointments, consistent with the conditions and requirements of the legal authority originally used to appoint the employee.

5. Reimbursable details of employees from outside agencies into DOE.

6. Non-reimbursable, external details of DOE employees to other agencies for longer than 240 days; this does not include DOE employees who are entering an Intelligence Community Joint Duty Agreement.

7. Appointments of paid experts and consultants using the Special Government Employee (SGE) authority.

8. Appointments made under the Pathways Internship (non-seasonal), Presidential Management Fellows (PMF) Program and the Recent Graduates Program.

   a. Exception: The NNSA Administrator may delegate approval of appointments made under the Pathways Internship program. Appointments made under the PMF Program and the Recent Graduates Program must be approved by the Office of the Secretary or the appropriate Approving Authority.

9. Conversions in the ordinary course to the competitive service of current DOE employees serving in positions within the Pathways Program, including the Internship Program, Recent Graduates Program, and PMF Program. Conversion is not guaranteed under the Pathways Program.

   a. Internship and Recent Graduates Programs: Requests to convert interns and recent graduates must be submitted for approval by the Office of the Secretary, or approval

by the appropriate Approving Authority, at least 60 days in advance of conversion eligibility.

i. Exception: The NNSA Administrator may delegate approval of conversions under the Pathways Internship program. Conversions under the Recent Graduates Program must be approved by the Office of the Secretary or the appropriate Approving Authority.

b. PMF Program: Requests to convert Fellows must be submitted along with the standard ERB certification package for approval by the Office of the Secretary, or approval by the appropriate Approving Authority, at least 60 days in advance of conversion eligibility.

c. If the initial Pathways appointment received approval from the Office of the Secretary or appropriate Approving Authority, the subsequent conversion of that appointment does not require approval.

10. As directed by the Deputy Secretary, and in accordance with the December 13, 2018, memorandum from the Chief Information Officer (CIO) and the CHCO, entitled *Federal Information Technology Acquisition Reform Act Impact on Chief Information Office Performance Evaluation and Hiring Processes*, the filling all positions in an Information Technology Management series (2210) must first be reviewed and approved by the CIO or Deputy CIO.

D. *Actions that do not Require Secretary or Approving Authority Approval*

The personnel actions described below do not require approval from the Office of the Secretary or appropriate Approving Authority, but must be reviewed by the requesting organization's servicing HR office, HR Shared Service Center, or OCEM to ensure the requests are compliant with the managed hiring process implementing guidance and to ensure consistency with Administration and Departmental priorities. ERB approval or OCEM review is still required for any executive action that normally involves ERB approval or OCEM review prior to effecting.

1. Staffing Plans.

a. Departmental Elements with a staffing plan that has been reviewed and approved by the Office of the Secretary may take personnel actions consistent with that staffing plan without obtaining subsequent approval from the Office of the Secretary. ERB approval or OCEM review is still required for any executive action identified within the staffing plan that normally involves ERB approval or OCEM review prior to effecting. HC will issue supplemental guidance on the development and approval of staffing plans.

2. Reallocations.

Actions that do not Require Secretary or Approving Authority Approval, cont'd

a. Heads of Departmental Elements may approve reallocation of current employees within the Department to meet the highest priority needs or to ensure that critical services are not interrupted. Approvals of reallocations cannot be further delegated.

b. For the purposes of this guidance, "reallocate" refers to internal placement actions, which include:

   i. Internal merit promotion actions (promotions of current DOE employees);

   ii. Internal reassignments (laterals) of non-SES employees;

   iii. Internal details, including details to unclassified duties;

   iv. Temporary promotions, including temporary promotions over 120 days and competitive details of non-SES employees to SES positions in excess of 240 days; and

   v. Re-promotion of employees who previously held a higher grade.

c. Reallocations of non-SES employees between Departmental Elements are permitted as long as both Heads of the Departmental Elements are in agreement.

3. Backfilling existing positions via external fill.

   a. Heads of Departmental Elements may approve the backfill of an existing position with a full performance level at the GS-13 or below (or equivalent) level via external advertisement. This approval cannot be further delegated.

4. Internal career ladder promotions.

5. Non-paid experts and consultants using the SGE authority.

6. Filling of positions under programs where limiting the hiring of personnel would conflict with applicable law or decision by a recognized adjudicative entity. Examples include, but are not limited to, personnel actions necessary to:

   a. Satisfy reasonable accommodation requests, including support personnel;

   b. Regularize improper appointments;

   c. Place persons with restoration rights accorded by law;

   d. Comply with the terms of any settlement agreement into which DOE entered to resolve an asserted or contingent claim;

Actions that do not Require Secretary or Approving Authority Approval, cont'd

e. Comply with a court order or decision issued by the Merit Systems Protection Board, Equal Employment Opportunity Commission, Federal Labor Relations Authority, Office of Special Counsel, or any other third party adjudicative entity with authority over DOE; and

f. Comply with an Office of Workers' Compensation Programs decision.

7. Conversions in the ordinary course to the competitive service of current DOE employees serving in certain positions with conversion authority. This includes:

   a. Veteran's Recruitment Act;

   b. Schedule A (Disability Hire);

   c. 30% Compensable Veteran; and

   d. Pathways Program conversion where the initial appointment was approved by the Office of the Secretary or appropriate Approving Authority.

8. Time limited appointments under 5 CFR 213.3102(r) in support of fellowship or professional/industry exchange programs (e.g., Fulbright, Truman Fellows, NNSA fellowship programs, Bonneville Power Administration's OPM approved fellowship programs, etc.); provided that the total number of individuals employed under this authority does not exceed the number of employees onboard under this authority on January 22, 2017.

9. Seasonal appointments made under the Pathways Internship Program (e.g., summer interns).

10. Volunteers, to include student volunteers.

11. Interns, or others who are similarly situated, who are secured via a contractual agreement with a third party provider and are not appointed.

12. Non-reimbursable, external details of employees from outside agencies into DOE.

    a. Heads of Departmental Elements may approve non-reimbursable, external details of employees from outside agencies into DOE. This approval cannot be further delegated.

13. Non-reimbursable, external details of DOE employees to other agencies for 240 days or less.

    a. Heads of Departmental Elements may approve non-reimbursable, external details of DOE employees for 240 days or less. This approval cannot be further delegated.

Effective Dates

This implementing guidance is effective immediately and will be updated, as required. These implementing procedures are effective unless and until subsequent, superseding guidance is issued.

Attachment

2018 Managed Hiring Process Form - Request for Approval of Personnel Action

cc: Human Resources Shared Service Center Directors
Human Resources Directors
HQ Resources Managers

Managed Hiring Process
Request for Approval of Personnel Action

Section A. BACKGROUND INFORMATION AND PURPOSE

The Department of Energy (DOE) will maintain a strategically directed and closely managed hiring process in alignment with the April 12, 2017, Office of Management and Budget (OMB) memorandum, *Comprehensive Plan for Reforming the Federal Government and Reducing the Federal Civilian Workforce*. This process requires approval for certain personnel actions as outlined in the *Managed Hiring Process Implementation Guidance and Procedures* issued by the Office of the Chief Human Capital Officer (HC).

This form should be used to provide the organizational justification for requesting approval by the Office of the Secretary of personnel actions, as outlined in the *Managed Hiring Process Implementation Guidance and Procedures*, and must be completed and signed by the Head of the Departmental Element, and the Under Secretary, if applicable.

Please complete this form and forward a current organizational chart and any relevant conversion documents, if applicable, to your HR Business Partner or Executive Consultant for review by HC, concurrence by the Executive Resources Board (ERB), if required, and approval by the Office of the Secretary.

1. Departmental Element:	
2. Organization:	
3. Title of Position:	
4. Pay Plan, Series & Grade/Band:	**5. # of Positions:**
6. Duty Location:	
7. Name of Hiring Manager:	
8. What type of action are you requesting? ☐ **Backfill an established position** **a. Name of Previous Incumbent:** **b. Date Position Vacated:** ☐ **Establish a new position** ☐ **Pathways Program Conversion** **a.** ☐ **Intern** ☐ **Recent Grad** ☐ **PMF** **b. Name of Employee:** **c. Date Eligible for Conversion:** **d.** Skip to Section B.	**9. Indicate how the position will be filled:** ☐ **Internally reassign** **a. Name of Employee:** ☐ **Internally recruit** ☐ **Externally recruit** ☐ **Pathways Program Appointment** **a.** ☐ **Intern** ☐ **Recent Grad** ☐ **PMF** ☐ **Other Internship or Fellowship Appointment** ☐ **Intergovernmental Personnel Action (IPA) or Detail from Another Agency** **a. Name of IPA/Detailee:** **b. Length of IPA/Detail:**

Managed Hiring Process
Request for Approval of Personnel Action

Section B. PRIORITIES AND RESOURCE JUSTIFICATION
1. Provide a brief description of the duties of the position.
2. Explain how this *specific* position is critical to meeting mission needs or legal requirements within your Departmental Element. Do not simply outline the mission of your Departmental Element.
3. Explain how this position fits within your Departmental Element's current and anticipated resources and funding levels. If applicable, explain how this position contributes to achieving workforce reductions and cost savings for the Department.
4. Provide additional detail regarding how the position will be filled. E.g., for internal selections, explain what the anticipated internal candidate pool is and how there are sufficient internal candidates to fill the position; for external selections, explain what internal staffing solutions were considered and why they are not feasible.

Managed Hiring Process
Request for Approval of Personnel Action

Title of Position: **Pay Plan/Series/Grade:**

SIGNATURES

Departmental Element and Under Secretary Approval:

_____ _____
Head of Departmental Element *Date*

_____ _____
Under Secretary, if applicable *Date*

Office of the Chief Human Capital Officer Review:

_____ _____
Date

Executive Actions Only:

_____ _____
ERB Chair *Date*

Office of the Chief Human Capital Officer
Office of Corporate Human Resources Operations
Manager Guide

Filling a Vacant Position

This Manager Guide provides basic information regarding filling a vacant position within the competitive service. It does not apply to any positions managed by the Office of Corporate Executive Management.

Your Human Resources Business Partner (HRBP) will assist you in determining where you might find the best candidates, deciding whether or not hiring incentives might be useful to recruit the best talent, and preparing any paperwork associated with the recruitment process.

- **The Position:** A position must have a properly classified position description before it may be filled.
  - You may elect to fill a position at the full performance grade level (e.g. GS-12) of a position, or
  - You may elect to fill a nonsupervisory position at a lower grade level with promotion potential to the full performance grade level (e.g. fill at the GS-09 level, with eventual promotion potential to GS-12).

- **Candidate sources:** There are several ways in which a federal position with DOE may be filled.
  - **Merit Promotion** vacancy announcement: Candidates with "status" may apply. This includes current competitive service DOE employees, certain employees of other federal agencies, certain former federal employees, certain veterans groups, and others. Your HRBP can discuss the complete list of status categories.
  - **Delegated Examining** vacancy announcement: Candidates without status – or all US citizens.
  - **Pathways Program** vacancy announcement: Candidates who are still in school or have recently graduated.
  - **Direct Hire** without vacancy announcement: Certain critical fill or shortage positions. Examples are GS-09 through GS-15 positions in the Contracting series, 1102 and Information Technology series, 2210.
  - **Special groups** without vacancy announcement: Veterans Recruitment Appointment, 30% Disabled Veterans, and certain other non-veteran disabled candidates.

- **Preparing to fill the position:** In addition to candidate sources, there are several additional things you should be prepared to discuss with your HRBP.
  - Will you offer to pay relocation expenses, a recruitment/relocation incentive, or a student loan repayment incentive?
    - Typically used for a critical or hard to fill position.
  - When using a vacancy announcement, when would you like the advertisement to open and close?
    - Once the candidate certificate is issued you will have 18 calendar days to make a selection. Set aside time on your calendar accordingly to ensure you are available to conduct interviews within a few days of the vacancy announcement closing date.

- **Job offers:** The HR Specialists at the Shared Service Center (SSC) are the only individuals authorized to make job offers. Your HRBP will discuss with you any negotiations that may arise during the job offer process. This may include pay setting flexibilities, the use of hiring incentives, and the effective date of the selectee's appointment.

- **Step-by-step process:**

Step 1: Plan and Consult:

- Speak with your Resource Manager/Program Office to ensure funding exists to fill the position including potential hiring incentives.
- Work with your HRBP to determine the most effective and efficient structuring of positions to accomplish the work of the unit and to review, update or create a Position Description, or to use a standardized Position Description.
- Consult with your HRBP on candidate sources and hiring incentives (when appropriate).

Step 2: Prepare and Submit Recruitment Package:

- Your HRBP will work with you to accomplish the following:
  - Completion of the Recruitment Request Checklist.
  - Completion of the Job Analysis (used to determine candidate qualifications).
- Your HRBP will prepare the SF-52 (recruitment request) in the Corporate Human Resources Information System (CHRIS) and forward it to you for approval.

Step 3: Prepare Vacancy Announcement:

- The Servicing HR Specialist will draft the vacancy announcement.
- You will have an opportunity to preview the vacancy announcement before it is posted.

Step 4: Identify and Contact Interview Panel: Before the announcement closes, you should:

- Speak with your HRBP to determine when your candidate certificate is likely to be issued.
- Identify and contact the individuals to serve on your interview panel.
- Block availability for the interview times/dates.
- Develop interview questions.

Step 5: Receive Selection Certificate: Your HRBP can assist with the following:

- The Servicing HR Specialist will send you an e-mail with instructions on accessing the candidate certificates and applications in the Hiring Management system.
- Certificates are issued for 18 calendar days; extensions may be requested and granted based on certain circumstances.
- You should then:
  - Conduct the interviews and reference checks within the 18 days.
  - Document any candidates who decline further consideration.
  - Retain interview and reference check notes for one year.

Step 6: Submit Selection Package: Your HRBP will assist with the following:

- You will document the disposition of each applicant in Hiring Management.
- You will also complete the OPM Manager's Satisfaction Survey and DOE Nepotism form
- Selection details such as:
  - Who will notify the candidates who are interviewed, but not selected.
  - Desired Entrance on Duty (EOD) date.
  - Relocation expenses or hiring incentives for the selectee.

Step 7: Job Offer: The SSC Servicing HR Specialist will make the job offer.

- A tenatative job offer letter will be sent to the selectee and will explain all pre-employment conditions of employment (e.g. drug test, security clearance, etc., as applicable).
- Once all pre-employment conditions of employment are met a final job offer letter will be sent to the selectee that will include the entrance on duty date and reporting instructions.

Department of Energy
Washington, DC 20585

February 13, 2020

MEMORANDUM FOR DIRECTORS OF SERVICING HUMAN RESOURCES OFFICES AND SHARED SERVICE CENTERS

FROM: STEVE ERHART
DEPUTY CHIEF HUMAN CAPITAL OFFICER

SUBJECT: Policy Memorandum #81, *Use of Government-Wide Direct-Hire Authorities*

PURPOSE: This memorandum establishes the Department of Energy's (DOE) policy concerning the use of government-wide direct-hire authorities for specific occupations. This memorandum cancels Policy Memorandum #34B, *Direct-Hire Authority (DHA) for Acquisition Positions*, dated May 28, 2014.

APPLICABILITY: This policy applies to all competitive service positions up through the GS-15 grade level or equivalent, as defined in 5 U.S.C. § 2102, within DOE.

EXEMPTIONS: This policy does not apply to the procedures governed by the Cybersecurity Workforce Act and the supplemental DHA supporting Cybersecurity workforce positions as noted in Executive Order 13833. The Department will provide a separate policy supporting EO 13833 when appropriate.

BACKGROUND: The U.S. Office of Personnel Management (OPM) periodically studies occupations to determine when there is a severe shortage of candidates or a critical hiring need for a position or group of positions. In doing so, OPM will authorize government-wide use of the Direct-Hire Authority (DHA), under 5 CFR § 337, to appoint candidates to positions without regard to the requirements in 5 U.S.C. §§ 3309-3318 and 5 CFR § 211 and §§ 337.201-337.206. Accordingly, the Department has determined that there is a severe shortage of candidates and/or a critical hiring need for the occupations listed in Appendix A, and thus has been authorized/re-authorized to use these government-wide direct-hire authorities.

REQUIREMENTS:

General Requirements:

1. SHRO/SSCs must establish supplemental operating procedures governing this process. This must include procedures for accepting late and unsolicited applications and the release and approval of selection certificates.

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2. The purpose of the DHA is to close critical skill gaps in the workforce; as such, the series listed in Appendix A may not be included in any Voluntary Early Retirement or Voluntary Separation Incentive (VERA/VSIP) requests.

3. The general restriction on movement after competitive appointment applies (5 CFR § 330.501). Employees may not be promoted, reassigned, detailed, etc., to a different position or geographical area within 90 days of appointment under a DHA.

4. Selectees must have U.S. citizenship (5 CFR §§ 7.3 and 338, and 8 U.S.C. § 1408). Foreign nationals and legal permanent residents as described in Policy Memorandum #7B, *Compensation of Foreign Nationals* are not eligible for consideration under this authority.

Recruitment:

1. Adherence to merit system principles and avoidance of Prohibited Personnel Practices (PPPs) apply.

2. Equal employment opportunity statutory requirements apply.

3. Recruitment should be from qualified individuals from appropriate sources, in an endeavor to achieve a workforce representative of all segments of society.

4. DHA may be used to recruit for permanent and non-permanent competitive service positions (e.g., career/career-conditional, term, temporary) with any work schedule (e.g., full-time, part-time). However, SHRO/SSCs must follow the specific guidance governing each DHA.

5. Reemployment Priority List (RPL) regulations apply to any permanent or time-limited vacancy (i.e., temporary, term Regulations under the Career Transition Assistance Plan (CTAP) and the Interagency Career Transition Assistance Program (ICTAP), apply to any position expected to last 121 days or more.

6. Employees eligible for priority placement under Office of Workers' Compensation Programs (OWCP) or other placement programs may be considered for DHA vacancies at any time during the recruitment process if they meet the minimum qualifications for the position.

7. Use of other hiring, pay, and/or leave flexibilities to address recruiting/retention difficulties should be considered. The issuance of a government-wide DHA for a particular occupation or group of positions does not preclude the use of other hiring authorities. See Appendix B for a list of flexibilities.

8. Reasonable Accommodation provisions apply.

Public Notice:

1. Public notice requirements in 5 U.S.C. §§ 3327 and 3330, and 5 CFR § 330 apply. Public Notice vacancy announcements (herein referred to as Vacancy Announcements) must be posted using the Department's Automated Hiring System (Hiring Management Enterprise System) for a minimum of five (5) calendar days. Announcements may be scheduled to close on a weekend or holiday, so long as assistance is available for applicants on the closing date. OPM's Delegated Examining Operations Handbook outlines procedures for accepting late applications.

2. Advertised positions must completely match the DHA occupation (i.e., must be classified with the same title and series or match the OPM group/occupation description), grade level(s), and duty location(s) listed in Appendix A of this memorandum.

3. Vacancy announcements must contain all of the required information listed in 5 CFR § 330.104 and must be formatted in a manner consistent with the Department's published agency-wide announcement templates. See Appendix C for an example DHA vacancy announcement.

4. Interdisciplinary positions must be posted and filled in accordance with OPM's Delegated Examining Operations Handbook and this policy memorandum.

5. The Department's RPL must be cleared prior to posting a vacancy announcement and again before filling the position (5 CFR § 330.210). Proof of RPL clearance must be filed in the corresponding case file.

6. Vacancy announcements must clearly identify application instructions and expectations and applicable qualification requirements, including the minimum qualification criteria for CTAP and ICTAP eligibles.

7. SHROs/SSCs must clear the Reasonable Accommodation of Last Resort List (found on HCNET) before posting vacancy announcements using this authority.

8. Human Resources Specialists/Supervisors overseeing and/or approving DHA certificates must have current Delegated Examining (DE) certifications.

9. Late application procedures (5 CFR part 332) as described in Chapter 4 of OPM's Delegated Examining Operations Handbook apply.

Open Until Filled or Open Continuous Job Opportunity Announcements (JOA):

1. Open until filled or Open Continuous announcements are allowed under DHA procedures. In such cases, SHRO/SSCs must identify cut-off dates and/or review of application deadlines within the body of the JOA.

2. Open until filled or Open Continuous announcements will satisfy public notice requirements for this purpose.

3. When SHRO/SSCs post open until filled/continuous announcements, unsolicited applications are allowed to be included in the applicant pool for consideration.

4. SHRO/SSCs must establish supplemental procedures that support the use of open until filled/continuous announcements, accepting unsolicited applications concurrent with an open until filled/continuous announcement and ensuring all hiring practices are in accordance with merit system principles.

5. SHRO/SSCs may also establish a maximum number of applicants per review period; however, this must be communicated in the JOA.

Qualifications, Rating and Ranking:

1. The DHA permits hiring without regard to:

   a. Veterans' preference; and

   b. Rating and ranking procedures (e.g., assessment questionnaire, written test, category rating).

2. Applicants must meet the following qualification requirements by the closing date of the vacancy announcement, or a date specified in the announcement, to be referred for a DHA vacancy:

   a. Minimum qualification requirements stated in the group coverage qualification standard, individual occupational requirements (IOR), and/or individual qualification standard for the applicable series (5 CFR § 338); and

   b. Any selective factors determined to be essential for performance of the duties and responsibilities of the position (e.g., foreign language proficiency, Federal or State requirements for licensure or certification).

3. A documented job analysis (JA) is required (5 CFR § 300.103) for each grade advertised and must be uploaded to electronic case file in the Hiring Management Enterprise System (HMES). The JA documentation may cover a single position or multiple positions or occupations with similar characteristics. At a minimum, the documentation will identify:

   a. The job requirements (e.g., specialized experience, selective factor(s), licensure, certification);

   b. The duties; knowledge, skills, and abilities (KSA) or competencies; and any necessary justifications which support the job requirements; and

c. The employees involved in the process (i.e., Human Resources Specialists, subject matter experts, and/or Selecting Officials).

Referral:

1. Applicants who meet the qualification requirements above are eligible for referral to the Selecting Official for consideration. Applicants will not receive a score (rating), be grouped, or be placed in a quality category (e.g., category rating).

2. Candidates will be referred in the following selection priority order:

   a. Reemployment Priority List (RPL) eligibles who applied to the announcement and are found to be well-qualified;

   b. Career Transition Assistance Plan (CTAP) eligibles who applied to the announcement and are found to be well-qualified;

   c. Interagency Career Transition Assistance Program (ICTAP) eligibles who applied to the announcement and are found to be well-qualified;

   d. Candidates who lost certification (from a previous announcement) due to an administrative error and are eligible for priority consideration;

   e. Candidates who are qualified under Reasonable Accommodations as a Last Resort; then

   f. All other qualified candidates eligible under the DHA.

3. If the vacancy announcement is for multiple grades and/or locations, CTAP, ICTAP, and lost certification eligibles will be referred (in the order listed above) ahead of all other candidates.

4. DHA certificates (or list of eligibles) will be configured as follows:

   a. A separate certificate (or list of eligibles) will be generated for each grade and location;

   b. The candidate veterans' preference code will *not* be listed;

   c. Candidates will be listed in alphabetical order; and

   d. Any unsolicited applications will be included on the selection certificate when the timeframe of the application corresponds with the open-until-filled position.

Selection and Appointment:

1. ICTAP and RPL (includes CTAP) eligibles receive selection priority.

2. At the time of appointment, with the assistance of the SSC/SHRO, the appointing official must ensure that the individual selected meets all of the requirements of the position (e.g., age, citizenship, qualifications, educational requirements, nepotism, suitability, medical, background investigation).

3. Selections made under the DHA, including selections of current Federal employees, will be processed as new appointments.

   a. Non-DOE Employees: 100 Career/101 Career-Conditional Appointment

   b. Current DOE Employees: Conversion to 500 Career/501 Career-Conditional Appointment

4. DHA appointments are subject to all competitive service and Department probationary requirements. The basic requirements are as follows:

   a. A probationary period is required for the first year of Federal service for career or career-conditional appointments (5 CFR § 315.801).

   b. The first year of service of a term employee requires a trial period regardless of the method of appointment (5 CFR § 316.304(a)).

   c. Supervisory and managerial positions require the first year of service to be a probationary period.

   d. Current (non-DOE) Federal employees given a new appointment under this DHA must serve a new probationary period.

   e. Current DOE Federal employees given a new appointment under this DHA must serve a new probationary period unless the position is in the same line of work and the employee has not had a break in service prior to the excepted appointment of 30 days or more.

   f. Temporary appointees do not serve a trial or probationary period.

5. Unless the specific authority states otherwise, candidates will still be appointed if the DHA expires during the recruitment process and the written job offer was mailed, emailed, or faxed on or before the ending date of the DHA.

6. When documenting direct-hire authority appointments on the SF-50, Notification of Personnel Action, or SF-52, Request for Personnel Action, SHRO/SSCS must use two Nature of Action authority codes: AYM as the first authority, identifying

the appointment under 5 CFR § 337; and a second authority, unique to each occupation/group of positions. Authority codes are listed in OPM's Guide to Processing Personnel Actions and in Appendix A of this memorandum.

7. Documentation for appointments made under this authority must be sufficient to allow for reconstruction of actions and must be maintained in the HMES for a timeframe consistent with OPM's Delegated Examining Operations Handbook, Appendix C - Records Retention and Disposition Schedule.

ROLES AND RESPONSIBILITIES:

Human Capital Policy Division will:

1. Evaluate new OPM-issued, government-wide direct-hire authorities to determine applicability to the Department.

2. Review occupational shortages, hiring needs, and DHA usage and effectiveness annually, and issue policy updates and requirements, as needed.

3. Request DHA extensions through OPM for specific occupations or groups of positions, as needed.

4. Submit reports to OPM on the Department's use of the DHA, when requested (5 CFR § 337.206).

5. Conduct appropriate oversight and/or assist with the Human Capital Management Accountability reviews.

SHROs/SSCs will:

1. Administer the use of the DHA through staffing, classification, and processing.

2. Oversee and monitor use of government-wide direct-hire authorities and ensure compliance with associated requirements.

3. Consult with the Human Capital Policy Division prior to filling a vacancy when there is an active Reasonable Accommodation of Last Resort List, more than one RPL and/or CTAP eligible under consideration, and prior to selecting a non-priority candidate over a priority candidate (i.e., RPL, CTAP, ICTAP eligible).

4. Respond to requests for information on DHA usage and effectiveness.

5. Provide sufficient documentation (by occupation or group of positions) to the Human Capital Policy Division to support DHA extension requests (5 CFR § 337, Subpart B).

6. Establish and maintain all DHA electronic records/documents in HMES.

7. Comply with requirements to make appointments under the government-wide DHAs.

DEFINITIONS:

1. **Career Transition Assistance Plan (CTAP):** An intra-agency program that helps "surplus" or "displaced" Federal employees improve their chances of finding a new job in their agency by giving them selection priority over other applicants.

2. **Competitive Service:** Includes all positions in which appointments are subject to the provisions of Chapter 33 of Title 5, United States Code. Positions in the executive branch of the Federal Government are in the competitive service unless they are specifically excluded from it.

3. **Interagency Career Transition Assistance Plan (ICTAP):** An interagency program that helps "surplus" or "displaced" Federal employees improve their chances of finding a new job at another agency (not their current or former agency), by giving them selection priority over other applicants from outside the agency.

4. **Lost Certification:** A type of erroneous certification that occurs when an applicant is mis-ranked on or left off a certificate, but correcting the error would not give the eligible real employment consideration. For procedures see: DOE Human Capital Policy Memorandum #31, *Procedures for Regularizing Illegal or Erroneous Appointments and Managing Priority Placements and Priority Consideration Cases*, dated February 18, 2014.

5. **Reemployment Priority List (RPL):** An intra-agency placement program that helps current and former competitive service employees who will be or were separated by reduction in force (RIF), or who have recovered from a compensable work-related injury after more than one year. In filling vacancies, an agency must give its RPL registrants placement priority for most competitive service vacancies before hiring someone from outside its own permanent competitive service workforce.

6. **Selective Factors:** Are knowledge, skills, abilities, or special qualifications that are in addition to the minimum requirements in a qualification standard, but are determined to be essential to perform the duties and responsibilities of a particular position. Applicants who do not meet a selective factor are ineligible for further consideration.

7. **Well-Qualified:** For CTAP/ICTAP eligibles, considered under DHA, the agency's definition of "well-qualified" (5 CFR §§ 330.606 and 330.704) is as

follows: experience that exceeds the minimum qualifications of the position, including any selective factors, demonstrated by proficiency in most of the requirements of the job, requiring only limited training or orientation to perform effectively. Examples of experience which may demonstrate the required proficiency level include: successfully completed diverse tasks of the job; applied and enhanced knowledge and skill in both usual and unusual issues; needs minimal guidance in addressing unusual situations; understands and can discuss the application and implications of changes to processes, policies, and procedures in the applicable area; help from an expert may be required from time to time, but can usually perform tasks independently. CTAP/ICTAP eligibles who do not meet the definition of "well-qualified," but who are otherwise eligible and minimally qualified, are referred with all other DHA candidates.

REFERENCES:

1. 5 U.S. Code § 2301 - Merit system principles
2. 5 U.S. Code § 2302 - Prohibited personnel practices
3. 5 U.S. Code § 3304 - Competitive service; examinations
4. Executive Order 13518, *Employment of Veterans in the Federal Government*, November 9, 2009
5. Executive Order 13548, *Increasing Federal Employment of Individuals with Disabilities*, July 26, 2010
6. 5 CFR § 337, Subpart B - Direct-Hire Authority
7. OPM Memorandum, *New Human Resources Flexibilities-Direct Hire Authority*, June 20, 2003
8. OPM Memorandum, *Announcing Government-wide Direct Hire Appointing Authorities*, October 11, 2018
9. OPM Delegated Examining Operations Handbook
10. OPM Guide to Processing Personnel Actions

ADDITIONAL INFORMATION: Questions concerning this policy memorandum should be directed to Tiffany Wheeler at (202) 586-8481 or tiffany.wheeler@hq.doe.gov, or Ahtora Brooks at (202) 586-1239 or ahtora.brooks@hq.doe.gov.

Attachments

1. Appendix A - Approved Government-Wide DHA Authorities for DOE
2. Appendix B - Hiring, Pay and Leave Flexibilities
3. Appendix C - DHA Sample Template

APPENDIX A - Approved Government-Wide Direct-Hire Authorities for DOE

Occupation	Series(s)	Grade Level(s)	Location(s)	Description	Authority Codes	Effective Date	Expiration Date
Information Technology Management (Information Security)	2210	GS-09 to GS-15 (or equivalent)	Nationwide	Approved as a result of Title XIII of the Homeland Security Act of 2002 in support of Governmentwide efforts to carry out the requirements of the Government Information Security Reform Act and the Federal Information Security Management Act.	AYM: Reg. 337.201 / BAC: GW-002	6/20/2003	Indefinitely or until OPM terminates this authority
Economist	0110	GS-11 to GS-15 (or equivalent)	Nationwide	Scientific, Technical, Engineering and Mathematics (STEM) positions, approved as a result of the President's Management Agenda (PMA). The PMA identifies "workforce for the 21st century" as a key driver of transformation, with particular emphasis on implementing a variety of improved workforce strategies, including enabling simple and strategic hiring to attract top talent. OPM looked at maximizing the use of currently available tools and authorities to help address some of the most pressing hiring needs.	AYM: Reg. 337.201 / BAH: GW-007	10/11/2018	10/10/2023
Biological Science	0401						
Fishery Biologist	0482						
General Engineer	0801						
Civil Engineer	0810						
Physical Sciences	1301, 1306, 1310, 1320 only						
Actuary	1510						
Mathematics	1520						
Mathematical Statistician and Statistician	1529, 1530						
Acquisitions	1102						
Computer Engineers (Cybersecurity)	0854	GS-11 to GS-15 (or equivalent)	Nationwide	Cybersecurity and related positions, approved as a result of the President's Management Agenda (PMA). The PMA identifies "workforce for the 21st century" as a key driver of transformation, with particular emphasis on implementing a variety of improved workforce strategies, including enabling simple and strategic hiring to attract top talent. OPM looked at maximizing the use of currently available tools and authorities to help address some of the most pressing hiring needs. For more information on these positions: see OPM Memorandum - Issuance of Final Interpretive Guidance for Cybersecurity Positions, October 15, 2018.	AYM: Reg. 337.201 / BAI: GW-008	10/11/2018	Indefinitely or until OPM terminates this authority
Computer Scientists (Cybersecurity)	1550						
Electronics Engineers (Cybersecurity)	0855						
*IT Cybersecurity Specialist	2210						

* These positions must require IT knowledge and IT competencies, the work must be coded to include cybersecurity functions as supported by the job codes in the: Guide to Data Standards and the NICE Cybersecurity Workforce Framework, 2017, and the cybersecurity work must be performed the majority of the time.

APPENDIX B – Hiring, Pay and Leave Flexibilities

Hiring Flexibilities:

- **Pathways Programs for students and recent graduates** (includes Internship, Recent Graduates, and Presidential Management Fellows (PMF) Programs). *E.O. 13562 and 5 CFR §§ 213 and 362*
- **CyberCorps Scholarship for Service (SFS) program** authorizes cybersecurity-related internships and post-graduation employment in the excepted service (with ability to noncompetitively convert to the competitive service) for scholarship recipients. *Public Law 113-274, Section 302 (https://www.sfs.opm.gov/AOFAQ.aspx)*
- **The 30% or More Disabled Veteran authority** allows an agency to non-competitively appoint any veteran with a 30% or more service-connected disability. *5 U.S. Code § 3112 and 5 CFR §§ 316.302, 316.402 and 315.707*
- **Schedule A Appointing Authority for People with Certain Disabilities**, individuals who have a psychiatric, intellectual, or severe physical disability. *5 CFR § 213.3102(u)*
- **Experts and Consultants** appointments to perform temporary or intermittent expert or consultant work; up to GS-15, Step 10. *5 U.S. Code § 3109 and 5 CFR § 304*
- **Details** within and between agencies for up to 120 days. *5 U.S. Code § 334; 5 CFR § 300, Subpart C; 31 U.S. Code § 1535; and 64 Comp. Gen. 370*
- **Intergovernmental Personnel Act (IPA)** details from local/state governments and educational institutions. *5 U.S. Code § 3371-3375 and 5 CFR § 334*

Pay and Leave Flexibilities:

- **Recruitment Incentive** or **Relocation Incentive** up to 25% of basic pay for hard-to-fill positions. *5 U.S. Code § 5753 and 5 CFR § 575, Subparts A and B*
- **Superior Qualifications and Special Needs Pay-Setting** permits agencies to set a new General Schedule (GS) employee's pay above Step 1 (up to Step 10), because of the employee's superior qualifications or the agency's special need of the candidate's services. *5 CFR § 531.212*

- **Federal Student Loan Repayment Program** permits agencies to repay up to $60,000 of a candidate's or current employee's Federally-insured student loans as a recruitment or retention incentive. *5 U.S. Code § 5379 and 5 CFR § 537*
- **Retention Incentive** for highly-qualified employees or employees filling a special agency need that are likely to leave the Federal service, up to 25% of basic pay for an individual or 10% for a group. *5 U.S. Code § 5754 and 5 CFR § 575, Subpart C*
- **Maximum Payable Rate** permits agencies to set pay at a higher than normal GS rate (not to exceed Step 10), based on the employee's pay in another Federal job. *5 CFR § 531.221-223*
- **Creditable Service for Annual Leave Accrual for Non-Federal Work Experience and Experience in the Uniformed Service** permits agencies to grant higher leave accruals based on non-Federal and military experience for hard-to-fill positions. *5 CFR § 630.205*

APPENDIX C- DHA Sample JOA Template

ABOUT

Announcement Number: DOE-16-11997-DH

Hiring Agency: Department of Energy

Position Title: Contract Specialist

Open Period: 08/22/2016 - 08/26/2016

Series/Grade: GS - 1102 09/11

Salary: USD $51,683 - USD $81,290

Promotion Potential: GS-11

Duty Location(s): # of Vacancies in Any Town USA

For More Info: HRS (202) 111-1111

OVERVIEW

Hiring Path: Open to the public

Clarification from the agency: This is a Direct-Hire Public Notice.

Security Clearance Required: Not Applicable

Appointment Type: Permanent

Marketing: About the Agency

Summary: This position is located in the Contracts and Strategic Sourcing organization of Supply Chain Services. Supply Chain Services is a value added, full service provider of procurement, warehousing, supplemental labor management, logistics, and fleet services; providing its internal customers a collaborative, seamless and timely method for obtaining equipment, materials, and services to support their work requirements, while ensuring ethical, risk appropriate business practices that are compliant with internal controls. This position serves as one of several contract specialists responsible for the full range of contract administration for preaward and postaward functions, including price/cost analysis, negotiation, and administration for services, materials, equipment and/or construction within a major spend category, organizational component, or in a geographical area associated with operating and maintaining a high-voltage electric utility industry.

Supervisory Position: No

Relocation Expenses Reimbursed: No

Travel Required: Occasional Travel; Occasional travel may be required.

DUTIES

As a Contract Specialist, at the full performance level, you will:

- Solicit, evaluate, negotiate, and award contracts to commercial organizations, educational institutions, nonprofit organizations, and State, local or foreign governments for furnishing products, services, construction or research and development to the Federal Government;
- Administer contracts by assuring compliance with the terms and conditions of contracts, including resolution of problems concerning the obligations of the parties;
- Terminate contracts by analyzing, negotiating, and settling claims and proposals;
- Analyze and evaluate cost or price proposals and accounting systems data;
- Plan, establish, or review contracts, programs, policies, or procedures;
- Formulate and administer policies and procedures to achieve Federal socioeconomic goals, such as those affecting small business, labor surplus areas, and disadvantaged business firms; and
- Develop acquisition strategies and direct or manage procurements.

QUALIFICATIONS AND EVALUATIONS

Requirements:

OTHER REQUIREMENTS:

- If you are a current federal employee, appointed under the direct-hire authority, you will be given a new appointment.
- You will be required to serve a mandatory one (1) year probationary period unless you meet the exceptions in 5 CFR part 315.802.
- You may be required to complete a Financial Disclosure Statement.

Key Requirements:

- You must be a United States Citizen.
- This employer participates in the e-Verify program.
- See "Other Information" section regarding Selective Service requirements.

Education Requirements:

EDUCATION: This vacancy has a positive educational requirement (see Basic Requirements). You **MUST** provide documentation supporting any education claims in your application. Education must be obtained from an accredited institution recognized by the U.S. Department of Education.

Foreign education must be reviewed by an organization recognized by the U.S. Department of Education. For special instructions pertaining to foreign education and a list of organizations that can evaluate foreign education, see the Department of Education website.

Evaluations:

HOW YOU WILL BE EVALUATED: This position is announced under a governmentwide Direct-Hire Authority (DHA) for Acquisitions positions in the 1102 series. Under the DHA, all applicants who meet the Education and Qualification requirements listed in this announcement, at the grade level they are applying, will be forwarded to the Selecting Official for consideration. Veteran's Preference, category rating, and traditional rating and ranking of applicants does not apply under the DHA process.

Federal employees eligible for career transition assistance plans such as CTAP or ICTAP, requesting selection priority, must meet the Education and Qualification requirements listed in this announcement, and be found "well qualified" for the position. Well-qualified is defined as: experience that exceeds the minimum qualifications of the position, including any selective factors, demonstrated by proficiency in most of the requirements of the job, requiring only limited training or orientation to perform effectively.

If your resume is incomplete or does not support the responses you provided in your online questionnaire, or if you fail to submit all required documentation before the vacancy closes, you may be rated 'ineligible' or 'not qualified'.

Qualifications:

Basic Requirements

A) A 4-year course of study leading to a bachelor's degree with a major in any field --*OR*--

B) At least 24 semester hours in any combination of the following fields: *accounting, business, finance, law, contracts, purchasing, economics, industrial management, marketing, quantitative methods, or organization management* --*OR*--

Exception: Employees in GS-1102 positions will be considered to have met the standard for positions they occupy on January 1, 2000. Employees who occupy GS-1102 positions at grades 5 through 12 will be considered to meet the basic requirements for other GS-1102 positions up to and including those classified at GS-12. This includes positions at other agencies and promotions up through grade 12. However, employees must meet specialized experience requirements when seeking another position.

In addition to meeting the basic requirements, applicants must meet the specialized experience as identified below.

Specialized Experience

A qualified candidate's online application and resume must demonstrate at least one year of specialized experience equivalent to the next lower grade level in the Federal service.

GS-09 level candidates must have one year of specialized experience at the GS-07 level. Examples may include:

1. Participating in the administration of a group of firm-fixed price contracts, requiring the employee to monitor progress of contractors, advise contractors, and coordinate requests for deviation.
2. Reviewing offers bids and preparing advertisements for public notice.
3. Determining appropriate method of procurement.
4. Preparing and issuing solicitation documents.

You may substitute education for specialized experience as follows:

- Master's or equivalent graduate degree; 2 full years of progressively higher level graduate education leading to such a degree; or LL.B. or J.D., which provided the knowledge, skills, and abilities to do the work --*OR*--
- Combination of education and experience as described above.

GS-11 level candidates must have one year of specialized experience at the GS-09 level. Examples may include:

1. Reviewing procurement requests.
2. Developing procurement plans based on previous history, market conditions, and specifications.
3. Preparing draft of final contracts.
4. Preparing and issuing solicitation documents.
5. Performing detailed analysis of bids or proposals received.

You may substitute education for specialized experience as follows:

- Ph.D. or equivalent doctoral degree; 3 full years of progressively higher level graduate education leading to such a degree; or LL.M., which provided the knowledge, skills, and abilities to do the work --*OR*--
- Combination of education and experience as described above.

[The recruitment KSACs, as determined through the JA process, must be listed in the JOA even though rating/ranking is not applied.]

The following knowledge, skills, abilities/ competencies are essential to performing the duties of this position:

1. **Problem Solving-** Identifies problems; determines accuracy and relevance of information; uses sound judgment to generate and evaluate alternatives, and to make recommendations.

2. **Planning and Evaluating-** Organizes work, sets priorities, and determines resource requirements; determines short- or long-term goals and strategies to achieve them; coordinates with other organizations or parts of the organization to accomplish goals; monitors progress and evaluates outcomes.

3. **Customer Service-** Anticipates and meets the needs of both internal and external customers. Delivers high-quality products and services; is committed to continuous improvement.

4. **Oral Communication-** Expresses information (for example, ideas or facts) to individuals or groups effectively, taking into account the audience and nature of the information (for example, technical, sensitive, controversial); makes clear and convincing oral presentations; listens to others, attends to nonverbal cues, and responds appropriately.

5. **Writing-** Recognizes or uses correct English grammar, punctuation, and spelling; communicates information (for example, facts, ideas, or messages) in a succinct and organized manner; produces written information, which may include technical material, that is appropriate for the intended audience.

"Experience" refers to paid and unpaid experience. Examples of qualifying unpaid experience may include: volunteer work done through National Service programs (such as Peace Corps and AmeriCorps); as well as work for other community-based philanthropic and social organizations. Volunteer work helps build critical competencies, knowledge, and skills; and can provide valuable training and experience that translates directly to paid employment. You will receive credit for all qualifying experience, including volunteer experience.

You must meet all qualifications and eligibility requirements by the closing date of this announcement.

Benefits and Other Info

Benefits URL: Review our Benefits

Other Information:

- **The U.S. Department of Energy fosters a diverse and inclusive workplace and is an Equal Opportunity Employer.**
- Veterans and persons with disabilities are encouraged to apply. For more information, please visit the links at the bottom of this page or visit the FedsHireVets website.
- If you believe that you are eligible for the Interagency Career Transition Assistance Program (ICTAP), please visit the OPM ICTAP/CTAP website for more information.
- More than one selection may be made from this vacancy announcement.
- Some positions may require completion of a probationary period of up to 1 (one) year.
- Many positions require successful completion of a background investigation.
- All males born after December 31st 1959 must abide by laws regarding Selective Service registration. To learn more about this law, visit the Selective Service web page, Who Must Register. If you are not registered and don't have an approved exemption, you will not be eligible for employment with the Federal government.

EEO Policy: https://www.usajobs.gov/Help/equal-employment-opportunity/
Reasonable Accommodation Policy: https://www.usajobs.gov/Help/reasonable-accommodation/
Veterans Information: https://www.usajobs.gov/Help/working-in-government/unique-hiring-paths/veterans/
Telework: www.telework.gov
Selective Service Registration: https://www.sss.gov/

How to Apply
How to Apply:

To be considered for this position, you must submit your complete application no later than 11:59pm U.S. Eastern Time on the closing date of this announcement. If you fail to submit a complete application prior to the closing time (regardless of when you started) the application system will not allow you to finish! Requests for extensions will not be granted, so please begin the application process allowing yourself enough time to finish before the deadline. Our application system displays a countdown timer in the top-left corner of the screen for your reference.

For your security, your session in our online application system will "time-out" if you are inactive for a certain period of time. We recommend that you preview the assessment questions before you apply and prepare all of your information prior to beginning the application. If you do get "timed-out" you will have to log back in to USAJOBS and re-visit the vacancy announcement, you can then click "Update Application" to finish where you left off.

Steps to submit a complete application:

1. Click the "Apply Online" button. If you are not already logged in, you will need to do so.
2. You must have a complete resume associated with your USAJOBS account. *Please note that some DOE offices do not accept uploaded resumes and instead require that you submit a USAJOBS-formatted resume using the Resume Builder.*
3. You will be prompted to select a resume and any documentation you have attached to your USAJOBS account before you are transferred to the Department of Energy's online application system. Please be aware that any document you select before being transferred to our system, will not automatically be received. You must take steps to download your documents from USAJOBS during the "Documents" step within our online application system (see Step 6).
4. If you are a first-time applicant to the Department of Energy, you'll be asked to register an account first. If you are a returning applicant, you will skip this step and go straight to the application portion.
5. You must respond to all applicant assessment questions, carefully following all instructions provided.
6. You will then be asked to upload additional supporting documentation. If you selected documents from USAJOBS prior to being transferred to our application system (Step 3), you will need to click the "USAJOBS" link to complete the transfer process. These documents ARE NOT automatically transferred! *It is ultimately your responsibility to make sure all required documents are either faxed, uploaded, or transferred from USAJOBS successfully. If you are unsure that your documents went through, please contact the HR Specialist listed on the announcement BEFORE the vacancy closes.*
7. After reviewing your submission in the final step, you must click "Submit Application" at the bottom of the page. If you leave the application before clicking Submit, your application will not be received.

If your resume does not support the responses in your application questionnaire, or if you fail to submit required documentation before the vacancy closes, you may be rated 'ineligible', or 'not qualified'.

NEED HELP?

- **If you experience any difficulties with the online application process (anything after you have clicked the 'Apply Online' button):** contact the HR Office listed on this announcement between normal business hours. If you are receiving any kind of error message, please be ready to provide a screenshot or at a minimum, the error message text and number. If necessary, we will put you in touch with the technical support number if we are unable to assist you personally.
- **If you need help with USAJOBS (searching for jobs, account password/profile issues, or Resume Builder):** please visit the USAJOBS Resource Center and select a topic of inquiry. Or, you may reach out to USAJOBS directly for support, by visiting the USAJOBS Contact Us page. We regret that we are unable to support any issues with USAJOBS, as this service is not maintained by the Department of Energy.

- **If you are experiencing a significant hardship which hinders your ability to apply online please contact the HR Office listed on this announcement during normal business hours to discuss your situation.**

Required Documents:

Please carefully review the following list to determine what documentation you need to submit. Some documents may not apply to all applicants. If you are unsure, click the link for each document type to read more.

ALL APPLICANTS: You must submit a resume supporting your specialized experience and responses to the online questionnaire.

- Your resume should list all work experience (paid and unpaid); you must list the full name and address of the each employer.
- For all types of work experience, you should indicate the start and end dates (include month, day, and year); you must also list the average number of hours per week that you worked.
- For paid work experience, please indicate your starting salary for each position and the highest salary you earned (if different).
- Your resume should also include any education and training you have completed (list the program title, subject area, number of hours completed, and completion date).
- For more information about what to include in your resume, please view this USAJOBS Resume Tutorial video on YouTube.

Most DOE offices will allow you to submit a resume in the format of your choice (as an attached document or as a USAJOBS Resume Builder format). However, some offices may require one specific format. You will be notified at the time you click 'Apply Online' which type of resume is acceptable. It is important that you are complete and thorough in your resume. If any of the above information is not included in your resume, we may not be able to fully credit you for your experience.

If specific educational requirements are indicated for this vacancy: Documentation verifying your educational claims which can include unofficial transcripts or any report listing institution, course title, credits earned and final grade. Please see the Education section for more information.

Veterans: veteran eligibility documentation (DD-214 Member #4 Copy, VA Letter, Standard Form (SF) 15 as applicable). Please note: If you are a veteran who has not yet been discharged, you may provide a statement of intent to discharge from your agency to receive Veterans Preference under the VOW (Veterans Opportunity to Work) to Hire Heroes Act of 2011.

Persons with Disabilities: Individuals with intellectual disabilities, severe physical disabilities, or psychiatric disabilities may apply for appointment through the Schedule A hiring authority. Certified verification of a disability from a licensed medical professional; a licensed vocational rehabilitation specialist; or any Federal, state, or District of Columbia agency or U.S. territory that issues or provides disability benefits will be required.

Displaced Federal employees who qualify for CTAP/ICTAP: If you are a former Federal employee who was displaced due to a Reduction-in-Force (RIF) or surplused by some other means, please submit a copy of the separation letter or RIF notice from your agency. To be selected under I/CTAP, you must still be found well-qualified for this position. Please see the OPM Guide to Career Transition for more information.

Next Steps:

After each step in the recruitment process, your status will be updated in our application tracking system. Once this happens, if you have elected to receive e-mail updates, you will be notified through your USAJOBS registered e-mail address. If you have not elected for e-mail updates, you can review your current application status in USAJOBS at any time. Please check that your USAJOBS profile contact

information is current and correct each time you apply to a job--this will ensure we are able to contact you as quickly as possible.

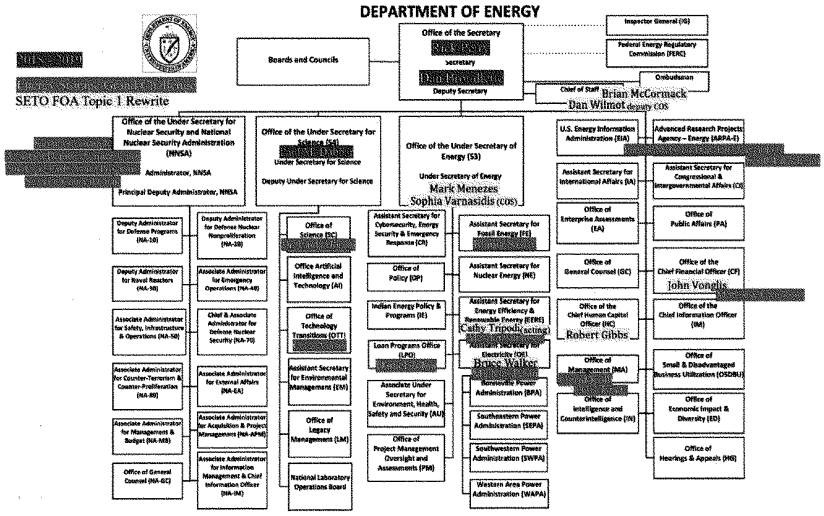
In addition to changing your status online, we will send you e-mail notifications at each major step in the process, to include: application received, eligible or not eligible, referred or not referred, selected or not selected.

Responses by Dr. Charles Gay

Questions and Responses for the Record
Dr. Charles F. Gay

1) *During your tenure as Director of the DOE Solar Energy Technologies Office, you oversaw the outstanding achievement of the SunShot goal of 6 cents/kWh. DOE recently announced an ambitious new campaign, the Energy Storage Grand Challenge, to accelerate the development, commercialization and utilization of next-generation energy storage technologies. Please describe some of the management principles that made SunShot a success that could be applied to support the Energy Storage Grand Challenge.*

- **A Clear Leader:** (Who's in charge?)
  (Although many organizations have tried "Two-in-a-Box," one must be the "greater of equals")
  - Expertise: deep and broad, long-standing technical expertise with global insights spanning technology and financing of capital goods, such as solar and storage. The Director of the Solar Energy Technologies Office was responsible and accountable for SunShot.
    - The Director assured a roadmap was in place, the long-term strategic plan was based on thorough analysis. Milestones were annually updated. Progress was independently reviewed on a biannual basis by U.S. solar industry stakeholders.
  - The Energy Storage Grand Challenge should have a clear leader with responsibility and accountability for results. The boxes in red below reflect key stakeholders as of July 2019. Since then, DOE's Nuclear Office has been added, along with the possibility of DOC's NIST Manufacturing Institutes. Who's in charge? Is this individual accountable and responsible?



- **<u>A Goal:</u> Crisply Stated (and easily referenced): e.g. $/kWh**
  - SunShot referenced a singular number for the "Levelized Cost of Energy" (LCOE). SunShot started as $1/W capital cost but soon shifted to $0.06/kWh to capture the importance of reliability (i.e., degradation rate and lifetime) and capacity factor (which led to an increase in use of systems that track the sun). LCOE incorporates lifecycle factors and enables first order technology comparisons
    - <u>Location sub-goals</u> were set for high sunlight, mid-sunlight and low sunlight
      - Kansas City, MO was selected as the mid-range (6¢/kWh). Seattle, WA was the reference for low sunlight (7¢/kWh) and Daggett, CA the reference for high sunlight (5¢/kWh).
    - <u>Application sub-goals</u> were set for three configurations sited in Kansas City, MO.
      - Power plants (6¢/kWh) in front of the substation
      - Commercial and industrial sites (7¢/kWh) behind the substation
      - Residential rooftops (9¢/kWh) behind the meter.
  - SunShot cost goals were structured to address $/kWh as a fraction in which the numerator was evaluated as $/unit area and the denominator as energy harvest/unit area.
    - The numerator was made smaller by reducing direct material costs without compromising durability (needed for 35^{+} year warranties), by identifying supply chain cost saving opportunities, building economies of scale and planning logistics cost savings. Accelerating the flow of material through the manufacturing process sequence with ever-increasing yield also reduced Capex per unit.
    - The denominator was made larger by increasing conversion efficiency through continuously improved understanding of the scientific underpinnings for optimized device design. Attention to maximizing efficiency for intensity and spectrum of sunlight, reduced thermalization loss, stability of packaging materials to UV light, heat, oxygen, moisture and temperature cycles received particular emphasis. Real-time metrology in the factory and the field contributed to maximizing energy harvest.
  - Storage has an energy value and offers significant additional value based on capacity, transmission (e.g. deferral of wiring changes) and ancillary services. All of these go "Beyond LCOE."
    - Storage value varies by application type.
      - e.g. in front of the substation. Siting a large battery bank on the same property as occupied by a substation can minimize infrastructure costs, such as being located within an existing fence-line, and can eliminate permitting and interconnection fees while adding resilience.
  - Storage has a controllable time-based value, which affects the physical form of technology choice. For example, short term energy delivery, over hours or days, might be best accomplished with batteries, including bi-directional integration of motive and stationary sources. While delivering grid services, the role of storage is to increase flexible optimization of generation assets and controllable loads. All of these facets contribute to ensuring improved affordability and reliability. Long term storage might be best accomplished by conversion to chemical form. In this manner, it is also possible for renewable energy to positively impact transportation sector energy consumption, often indexed by consumers as $/gallon.

2) *EERE leadership told Committee staff last fall about a new process by which senior EERE political officials would engage in review and modification of Funding Opportunity Announcements after they have been drafted in their entirety. EERE leadership suggested that this process helps make sure there is better coordination between programs.*

   a. *Would it be your preference to see the perspectives of political leadership and other DOE programs incorporated at an earlier stage in the process?*
      - Yes, as has previously been the case

   b. *If appropriate consultation and intra-agency coordination is happening at the early stages of FOA development, then do you believe that it is appropriate for politically appointed Deputy Assistant Secretaries to review and edit funding opportunities another time at the final stage before the public release of a FOA?*
      - No, because such intervention runs counter to well-established Standard Procedure.

Reasoning:
The Department of Energy's document: EERE S 540.110 defines the FOA (Funding Opportunity Announcement) Development Standard Operating Procedure. "Standard Operating Procedures (SOPs) articulate EERE's commitment to strong program planning and project management capability. These SOPs represent a broad set of business practices that demonstrate EERE's proficiency as a steward of the public's trust in the commitment, obligation, and expenditure of federally-appropriated funds" for the intended purpose.

The EERE "...Technology Office defines the requirements for the FOA and convenes a team to coordinate and manage the development process. The FOA Team creates a FOA Requirements Document (FRD) which outlines key features of the FOA. After FRD approval, the FOA Team drafts the FOA and coordinates review. EERE then ensures DOE has approved the FOA concept, coordinates congressional notification (if applicable), and publishes the FOA."

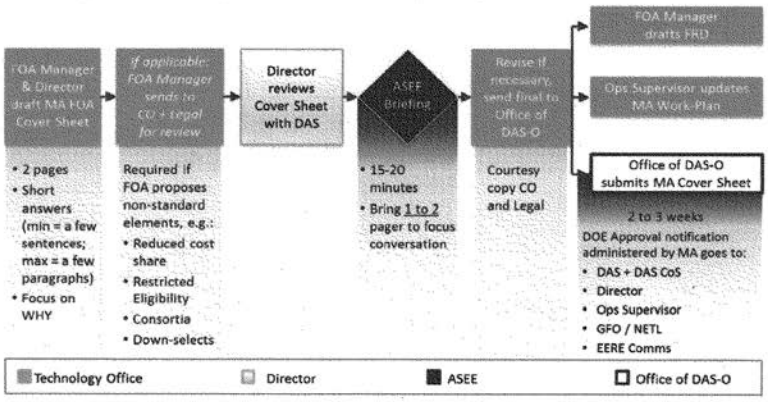
This process has been refined over many years. It is a well-defined, time-tested progressive iteration-approximation approach to incorporating the dimensions and considerations of multiple variables, including but not limited to: technology roadmaps, Multi-Year Program Planning (https://eere-intranet2.ee.doe.gov/document/multi-year-program-plan-guidance-and-template), overall program goals and objectives, administration priorities, DOE and EERE initiatives, stakeholder inputs (e.g. from requests for information (https://eere-intranet2.ee.doe.gov/document/request-information-rfi) and public workshops (https://eere-intranet2.ee.doe.gov/document/federal-register-process-workshops), the current project portfolio within a given office, congressional appropriations and direction, state-of-the-art in technology, the rate of change occurring within a given technology, and the search for breakthrough ideas, which are intrinsically unpredictable.

Waiting until a time, after which the FOA has been drafted in its entirety to make edits, obviates the virtuous cycle of continuous improvement and collaborative engagement across the panorama of stakeholders characterized above. Furthermore, making such a change does not address the root cause of consternation that was linked with Topic 1 of DE-FOA-0001840. The original FRD leading to said FOA was reviewed and approved by then acting EE-1 Simmons on 20 November 2017. This approval allowed detailed collaborative discussions and inclusive coordination between the Solar Energy Technologies Office (SETO), the Buildings Technologies Office (BTO), the Grid Modernization Initiative (GMI) and Grid Modernization Laboratory Consortium (GMLC) as well as with the Office of Electricity. Deeply experienced DOE career staff from each of these stakeholder groups with specialized expertise were engaged in drafting the wording used in the FOA in close collaboration for the DOE contracting team.

The details of "Topic 1" also aligned with Secretary priorities, which included strengthening the reliability and resilience of the electric grid while integrating solar energy. https://www.energy.gov/articles/energy-department-announces-achievement-sunshot-goal-new-focus-solar-energy-office. Administration priorities were incorporated according to OMB Administration R&D Budget Priorities memo (M-17-30) regarding American Security: Agencies should invest in R&D to increase the security and resilience of the Nation's critical infrastructure. Special attention should be paid to R&D that can support the safe and secure integration into society of new technologies that have the potential to contribute significantly to American economic and technological leadership. https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2017/m-17-30.pdf Direct reference to the criteria identified in both of these documents was demonstrated in the prescribed review with MA.

In short, SETO and other Department of Energy Offices have historically operated in a timely, cost-effective and efficient manner by incorporating the perspectives of political leadership from the earliest stage and in partnership with career staff to meet the American taxpayer's interests. After receiving the green light from EE-1 Simmons in November 2017, a full review was held with the career and political staff. Ingrid Kolb chaired the MA review at 3:30 p.m. on 26 January 2018 in Forrestal room 4A-107. Per SOP, "...The approval process was instituted DOE-wide in 2017 to ensure that all financial assistance actions, whether competitive (FOAs) or non-competitive (DNFAs), align with the Administration's energy priorities. The process is facilitated by the DOE Office of Management (MA). The approval requirement is not specific to EERE, rather, it applies to any office that conducts financial assistance actions across the DOE complex (e.g., Office of Electricity, Office of Fossil Energy, Office of Science, ARPA-E, etc.)."

The DOE review and approval process is reflected in the following flow chart:



Formal approval to proceed was awarded by MA shortly after Congress approved the FY2018 budget. This was not the end of ongoing collaboration with the range of offices referenced above but continued through the full sequence of steps defined in the SOP including final Federal Consensus Panel Merit Review in August 2018.

With regard to "the new process," proper protocol for any change is specifically defined in the SOP: **"The EERE Change Control Board manages changes to the SOP and related templates (**https://eere-intranet2.ee.doe.gov/sites/default/files/documents/EERE%20I251.1%20EERE%20Directives%20Program%20issued%2020160818_0.pdf**). The Change Control Board considers input from subject matter experts from the EERE Technology Offices, Operations Offices, the Golden Field Office (GFO) and the National Energy Technology Laboratory (NETL) to ensure that the process documented in the FOA SOP continues to improve and reflect the business practices that improve efficiency and add value to EERE staff."**

The SOP also defines what actions are necessary, when major changes to DOE-Approved FOAs occur, as was the case in point with "Topic 1" in which there was a change to TRL level in part two of DE-FOA-0001987, along with the re-write.

"The following changes require a new submission to MA:

- Change to Overall FOA Concept
- TRL level increase"

It should be noted for the record that no new submission to MA took place after the plug was pulled on "Topic 1."

According to SOP, once MA has approved the FRD, all subsequent actions can take place concurrently with the FOA review cycle and Public Announcement review cycle but must be completed prior to FOA publication. Waiting until the entirety of the FOA has been drafted for political officials to review and potentially modify the FOA undermines the perception, if not the reality, of technological objectivity and significantly lengthens the execution timeline, adding cost and potentially testing congressional guidance and direction. Furthermore, it appears to render moot the role of MA.

Responses by Mr. Arjun Krishnaswami

Responses to Questions for the Record from the
U.S. House of Representatives, Committee on Science, Space, and Technology
Subcommittee on Investigations & Oversight and Subcommittee on Energy

Management and Spending Challenges Within the Department of Energy's Office of Energy Efficiency and Renewable Energy

Arjun Krishnaswami
Policy Analyst
Natural Resources Defense Council
March 6, 2020

Dear Chairs Foster, Fletcher, and Johnson, Ranking Members Norman, Weber, and Lucas, and distinguished members of the subcommittees:

Thank you for the opportunity to participate in the hearing entitles "Management and Spending Challenges Within the Department of Energy's Office of Energy Efficiency and Renewable Energy." My responses to the Questions for the Record are below.

Sincerely,

Arjun Krishnaswami
Natural Resources Defense Council

Questions for the Record to:
Arjun Krishnaswami
Policy Analyst, Climate & Clean Energy Program
Natural Resources Defense Council
Submitted by: Representative Bill Foster (IL-11)

1. **In written documentation that EERE sent to our staff about the spending delays, the Department said that "EERE's increased carryover in FY19 and FY20 is primarily caused by the delay in appropriations in FY18."**
    a. **Do you believe this explanation from the Department is adequate? Has DOE had to operate under Continuing Resolutions throughout the past decade, prior to FY2018?**

There is no doubt that Continuing Resolutions are an ineffective way to run federal programs. However, we do not believe this explanation from DOE is adequate to justify the delays in spending. FY19 was the first time in nine years that Congress passed a full year of funding for DOE on time. That means that for most of the prior administration, DOE was operating at least partially with CRs. Despite operating under CRs in these years, DOE had lower carryover balances and spent appropriated funds more promptly than in FY18 and FY19, according to the analysis we presented in our written testimony.

Moreover, in placing blame primarily on CRs, the administration ignores the staffing shortage that undoubtedly is contributing to DOE's inability to catch up on spending appropriated funds. If the administration is concerned about needing to spend money more quickly to alleviate the impact of CRs, it should bring EERE employee count to an adequate level, as Congress requested in the FY20 appropriations bill.

    b. **It is conventional wisdom for research agencies to not issue new FOAs while they're operating under a Continuing Resolution for their appropriation from Congress. Do you have any thoughts about this practice?**

Agencies like DOE will operate most effectively if Congress passes appropriations bills on time, and we urge Congress to work hard to do so. The people who rely on these programs, including researchers, businesses, and everyday people, want to see the programs operating smoothly without disruption, which means on-time spending bills and consistent operation of the programs from DOE.

However, we recognize that late spending bills are now a frequent occurrence and will likely continue to be. Therefore, it's important that DOE and appropriators come to agreement on the best protocol for operation of the agency under CRs. At a minimum, DOE staff should be able to issue notices of proposed funding opportunities at the beginning of the fiscal year that give potential applicants a heads up for what is coming, even before the full announcements are released. It may even make sense to allow DOE to issue funding opportunities using direction from the previous year under a CR.

    c. **What are some of the most effective strategies you have seen that can allow DOE to keep spending at healthy rates under an environment of budget uncertainty?**

DOE can take several steps to keep spending at healthy rates.

First, DOE should hire staff to get EERE's employee count back up to adequate levels. The number of full-time equivalents has decreased over the last several years, as funding levels have increased. As a result,

each employee is responsible for spending 60 percent more money, on average, than in 2015. Filling gaps in hiring can help DOE spend appropriated funds at a healthy rate, especially in years when Congress passes a late spending bill and the agency has less time to issue funds.

Second, DOE should use the budget request process to make detailed plans to run the programs. In the prior administration, DOE's detailed budget requests provided roadmaps to spend appropriated funds after Congress passed each spending bill. But under this administration, DOE has produced budget requests with far less detail and with proposals to eradicate or seriously cut major parts of the agency, which means that the budget request is essentially useless when Congress rejects the cuts and funds DOE at more reasonable levels. DOE would do well to produce more serious budget requests that the agency can realistically use to plan to operate the programs.

Third, DOE should begin planning to spend funds, even if Congress has not passed a spending bill. While operating under a CR, DOE can at least begin planning and designing funding opportunities so that the agency can more quickly publish the opportunities once the spending bill is passed.

Questions for the Record to:
Arjun Krishnaswami
Policy Analyst, Climate & Clean Energy Program
Natural Resources Defense Council
Submitted by: Representative Daniel Lipinski (IL-3)

1. **Addressing climate change has been one of my top priorities since coming to Congress. Supporting renewable energy and energy efficient technologies play an important role in addressing this challenge. Additionally, these technologies have tremendous market potential around the globe.**
    a. **What are the impacts of delayed EERE funding on our research competitiveness?**

Addressing the climate crisis requires total, rapid transformation of the global economy toward clean energy. Countries that recognize this fact are in a race to invent, develop, deploy, and manufacture the technologies that will pave the way to a cleaner future—and help bring about a healthier, more equitable economy. For many nations, that race includes ramping up funding for clean energy research and development as well as finding the most effective ways to accelerate technology development and adoption. The United States must increase funding for clean energy innovation to stay competitive in the global clean energy race and to contribute its fair share to global decarbonization.

However, when DOE fails to spend funds on time, the United States falls one step further behind in the global clean energy race. The urgency of the climate crisis demands a similar sense of urgency in implementation of federal clean energy programs. Moreover, DOE programs, including EERE, have nurtured a robust ecosystem of researchers and businesses that are leading the development of clean energy technologies. When EERE fails to give out grants on time, cancels grants, or capriciously changes procedures, it disrupts the ecosystem and makes it more difficult for the nation's top scientists and businesses to do their crucial work.

For example, in 2017, DOE implemented a new review process for technical assistance, which created uncertainty and disrupted several projects. The Government Accountability Office investigated the impacts of the delays that resulted from the new review process for ARPA-E grantees.[1] GAO's investigation showed that the delays negatively affected grantees in several ways. First, the uncertainties created by the review process forced grantees to delay their project timelines and made it more difficult for the grantees to find well-qualified staff for the projects. Because of the delays in DOE funding, the grantees had to delay hiring announcements and also faced difficulties retaining staff. Some grantees also had to delay purchasing important equipment and change the scope of their projects. The delays may have also caused grantees to lose their advantage against competing companies or technologies.

While the GAO report specifically focused on ARPA-E, the learnings are applicable to EERE as well. ARPA-E and EERE grantees are doing work that the private sector will not conduct on its own, so these researchers and businesses are dependent on federal funding to continue making progress. As a result,

[1] United States Government Accountability Office, *New Process to Review Financial Assistance for Research Projects Created Uncertainty*, February 2018, https://www.gao.gov/assets/700/690391.pdf.

uncertainty in EERE and ARPA-E can seriously disrupt the innovation ecosystem and slow U.S. progress in the global clean energy race.

b. What might be the potential implications for our economy?

EERE programs have had a significant positive impact on the U.S. economy. EERE investments help cut down barriers to development and commercialization of new clean technologies. Without these programs, we likely would not have the clean energy technologies we have today at the same scale. In lowering barriers to technology development, these programs catalyze investment from the private sector and help grow new clean energy industries, while saving energy and money for customers. In fact, $12 billion of EERE investments over the past two decades have resulted in more than $388 billion in net economic benefits to the United States.[2] That's $33 of benefits to the public for every taxpayer dollar invested.

These programs have helped commercialize cornerstone clean energy solutions, like wind farms, solar panels, and electric vehicles. In doing so, they have contributed to the booming clean energy economy powered by more than 3 million people employed in energy efficiency, renewable energy, and clean transportation industries throughout the country.

The opportunity for further economic benefits from clean energy is huge—and it's ours for the taking. But disruptions in EERE programs put those economic benefits at risk.

Furthermore, the impacts of climate change pose the most serious economic risk of all. If the United States fails to address climate change, critical industries are projected to collapse, as costs increase, trade declines, infrastructure fails, and productivity drops.[3] Any disruption in existing programs to make progress on climate change—like DOE's clean energy work—is a step backward in preventing these dire economic consequences.

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[2] U.S. Department of Energy, "Aggregate Economic Return on Investment in the U.S. DOE Office of Energy Efficiency and Renewable Energy," October 2017, https://www.energy.gov/sites/prod/files/2017/11/f46/Aggregate%20ROI%20impact%20for%20EERE%20RD%20-%2010-31-17%20%28002%29%20-%2011-17%20%28optimized%29.pdf.

[3] USGCRP, 2018: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018.

Appendix II

Additional Material for the Record

REPORT SUBMITTED BY REPRESENTATIVE BILL FOSTER

Innovation Delayed:
Reviewing the Department of Energy's Withdrawal and Reissuance of Millions of Dollars Intended to Advance Solar Energy Technologies

A Majority Staff Report
Prepared for Members of the Committee on Science, Space & Technology

February 2020

Background

The Office of Energy Efficiency & Renewable Energy (EERE) at the Department of Energy (DOE) serves as the leading Federal office for research & development to advance energy efficiency and renewable energy technologies. EERE's Solar Energy Technologies Office (SETO) aims to make solar energy resources in the United States more affordable, accessible, and reliable for Americans. In Fiscal Year (FY) 2020, SETO accounted for $280 million of EERE's total $2.848 billion budget.

To drive down the cost of solar electricity and improve the performance of solar technologies, SETO supports high-impact research by investing in innovative projects through Funding Opportunity Announcements (FOA). These FOAs encourage collaborative research partnerships among industries, universities, national laboratories, federal, state, and local governments, and nongovernment organizations.

Applicants to FOAs must go through a highly competitive solicitation process that includes rigorous peer review. After applications undergo review, projects are selected for negotiation to receive DOE funding. Starting in 2018, SETO has issued a large office-wide FOA each year, which accounts for the lion's share of the program's competitively awarded grant funding.

On April 17, 2018, former Secretary Rick Perry announced[1] that the FY18 SETO FOA[2] would fund about 70 awards, each ranging between $200,000 and $4.5 million, for a total investment of $105.5 million.[3] Awards were to be separated into four distinct topics:

- **Topic 1**: Advanced Solar Systems Integration Technologies (ASSIST)
- **Topic 2**: Concentrating Solar Power Research and Development
- **Topic 3**: Photovoltaics Research and Development
- **Topic 4**: Improving and Expanding the Solar Industry through Workforce Initiatives

DOE estimated $46 million would be awarded under Topic 1 across approximately 14 projects. It is the Committee's understanding that EERE drafted the FY18 SETO FOA between October 2017 and March 2018 in coordination with subject matter experts from DOE's Office of Electricity. Specifically, the FOA was approved by Daniel Simmons (Assistant Secretary for EERE) in November 2017, the Office of Management in January 2018, and EERE Chief of Staff and Acting Deputy Assistant Secretary for Energy Efficiency Alex Fitzsimmons in March 2018.

The milestones outlined in the FOA and other DOE planning documents were:

- May 9: Concept Papers due
- July 5: Deadline for Full Applications
- August 8: Deadline for applicants to reply to reviewer comments
- September 3: Expected announcement of award finalists

Cancellation of the Original FOA

Originally, award finalists for the FY18 SETO FOA were to be announced on September 3, 2018. However, on August 31, despite already having completed a rigorous merit review and selection process for applications to this FOA, EERE cancelled Topic 1 ($46 million of the ASSIST opportunity) at the direction of then-Acting Assistant Secretary for EERE, Ms. Cathy Tripodi. EERE contacted applicants with an email notice saying that SETO planned to revise and reissue Topic 1 as a separate FOA to be released on September 15. Applicants were told they needed to submit a new application to compete for Topic 1 funding.

> SETO FOA TOPIC AREA 1 NOTICE
>
> On behalf of the Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy (EERE), we would like to thank you for submitting an application in response to the Solar Energy Technology Office (SETO) FY18 Funding Opportunity Announcement (FOA) DE-FOA-0001840. We are writing to inform you of a change to Topic Area 1 of the FOA, Advanced Solar Systems Integration Technologies.
>
> DOE is committed to improving the affordability of energy technologies and strengthening the Energy Sector's capability to withstand cyber and physical threats, including natural disasters. Improving the strategic location and situational awareness of solar systems can help ensure continuity of service in the face of widespread and coordinated threats. Developing innovative approaches to accelerate the transfer of solar system solutions that will improve Energy Sector resilience is also a priority.
>
> In order to better align the FOA objectives to the mission objectives of DOE, EERE plans to revise Topic Area 1 and issue a new FOA. **Because a new FOA is planned, if you would like to apply to the revised Topic Area 1, an application must be submitted under the new FOA in EERE Exchange by the deadline**. Please carefully review the revised emphasis and program objectives when the new FOA is issued, and revise your application accordingly.
>
> On behalf of EERE, we would like to express our sincere appreciation for the significant time and effort you and your team invested in preparing this application, and for your interest and participation in the EERE Solar Energy Technologies Office activities. We hope that you will continue to participate in future activities and programs with EERE.
>
> The Notice of Intent to Issue Funding Opportunity Announcement No. DE-FOA-0001987 is provided below for your reference.

On September 10, 2018, Democracy Forward—a nonprofit, government watchdog group—submitted a request to DOE under the Freedom of Information Act (FOIA) seeking all correspondence on the cancellation of Topic 1. Democracy Forward then filed a lawsuit on October 25, 2018 to compel DOE's compliance with the FOIA,[4] noting that as of the filing, DOE had not responded to the FOIA request with any records or any reasons for withholdings. In the filing, Democracy Forward argued that DOE's decision to cancel Topic 1 was arbitrary and that the public deserved to know why DOE elected to waste the time and money of prospective grantees and taxpayers.[5] Democracy Forward spent several months in court to eventually obtain

more than 3,000 pages of related documents and emails, and it released hundreds of emails to the media in August 2019. Excerpts from those document productions are included below.[6]

EERE officially released[7] the revised ASSIST FOA[8] on October 15, 2018 and selected 10 award finalists on March 25, 2019 to receive $36 million in funding.[9]

Committee Concern: Fabricated Justification and Departure from Usual Process

EERE told Committee Staff in September 2019 that it cancelled Topic 1 because it lacked adequate focus on grid resilience and cybersecurity. Committee Staff asked DOE for additional information about how this determination was made but did not receive further clarification. DOE has indicated that coordination with the Office of Electricity was needed in order to ensure that the revised FOA would incorporate grid-related concerns to an adequate measure. Committee Staff were perplexed by this explanation, as agency documents clearly indicate that SETO coordinated "closely" with the Office of Electricity in the process of drafting the original FOA between October 2017 and March 2018.

In fact, agency documents indicate that the initial impetus for the recompete was that Ms. Tripodi and Katie Jereza, former Deputy Assistant Secretary of DOE's Office of Electricity, simply did not understand the Topic 1 language and called for its cancellation as a result. On July 30, 2019, Ms. Tripodi emailed staff in DOE's Office of Electricity to initiate a rewrite of Topic 1 as follows:

From:	Tripodi, Cathy
Sent:	Monday, July 30, 2018 1:44 PM
To:	Walker, Bruce;Lotto, Adrienne;Jereza, Catherine
Subject:	Update: Solar Transmission Grid FOA
Attachments:	Solar Grid RFP.docx

Hi Bruce, Adrian and Katie:

The solar office has offered to rewrite Topic 1 in their Solar FOA. While it is on the street, we can just do an amendment to change it. Katie and I had reviewed it with the solar Team and we did not understand it and so I was hoping that you all could rewrite it to achieve the grid integration consistent with OEs mission. Please see (b) (5) and give me your suggested language as soon as you can. It is approximately $50 million.

Thank you,
Cathy T.

Despite Ms. Tripodi's representations that the solar office had offered to rewrite Topic 1 as of July 30, it is apparent that EERE career staff were largely cut out of the decision to do so. Ms. Tripodi did not deliver the final word that she would require a rewrite to SETO, including its director, until at least August 28 – a full four weeks after setting the process in motion with the Golden Field Office.

From: Tripodi, Cathy
Sent: Tuesday, August 28, 2018 7:36 AM
To: Passarelli, Derek <[redacted]
Subject: RE: Misc1.docx

Hi Derek: I got caught up in another project and will get back to you around or before noon today. And I would like to be the ones to socialize it first with SEIO so please give me until noon but let's plan on going with the schedule you proposed with a slight pause until noon. Thanks, Cathy T.

From: Passarelli, Derek
Sent: Monday, August 27, 2018 7:01 PM
To: Tripodi, Cathy <[redacted]
Subject: RE: Misc1.docx

I do. **(b) (5)**

Do you want us to proceed with preparing the FOA? We would need to reach out to SEIO to work with them to prepare the FOA Requirements Document and the FOA.

Also, if you would like us to quickly prepare a Notice of Intent, we will need to reach out to SEIO to begin that process.

Similarly, the process for re-issuing the FOA itself circumvented career staff with decades of experience.

From: Passarelli, Derek
Sent: Monday, August 27, 2018 6:41 PM
To: Tripodi, Cathy <[redacted]
Subject: RE: Misc1.docx

Cathy,

I have reviewed and run a comparison of the language you provided relative to the original FOA Topic 1 language. **(b) (5)**

From: Tripodi, Cathy
Sent: Monday, August 27, 2018 2:18 PM
To: Passarelli, Derek <[redacted]
Subject: Misc1.docx

Derek: what do you think of this language? Cathy T.

<< File: Misc1.docx >>

In a September 6, 2018 email, DOE Golden Field Office staff reached out to the director of Systems Integration for SETO to ask for information about the new version of the FOA.[10] Despite his role as the technical lead for DOE on the specific topic of integrating solar power to the grid, the director replied, "I have not been involved, so far, with the decision on topic 1 reissuance."[11] The Deputy Assistant Secretary for Renewable Power for EERE noted that he only learned that Topic 1 would officially be cancelled the night before the decision was made public, and only learned that the applicants to Topic 1 had received cancellation notices the week after it happened.[12] The DOE Chief Financial Officer seemed similarly cut out of the process. Internal emails from September 1, 2018 – the day after Topic 1 was cancelled – show that the CFO was completely unaware of the cancellation when he was contacted by Congressional Appropriations staffers who had concerns.[13] Another staffer in the CFO's office explained that she had been only notified "late" the night before the notification email went out to all FOA applicants.[14]

Furthermore, despite the added references to grid resilience and cybersecurity, experts in solar energy technology development, including the Director of SETO when this FOA was cancelled and subsequently replaced, Dr. Charles Gay, have informed Committee Staff that the final ASSIST FOA is substantially similar to the original Topic 1. Committee Staff question the value to the taxpayer in re-issuing Topic 1, considering the additional federal funds spent and delay in issuing awards. One applicant that spoke with the Committee wondered why DOE could not have moved forward with the original FOA and introduced the new language on resilience and security into the FY19 FOA, since SETO issues its office wide FOA every year. Most applicants noted to Committee Staff that this was the first time DOE had canceled a FOA so late in the process. However, several applicants felt disempowered, saying that since DOE funds most R&D in this area, they had no other choice but to accept the situation and move on.

Committee Concern: Wasted Federal Funds

Agency documents obtained by Democracy Forward show that the entire process of cancelling the original FOA at such a late stage and re-issuing the competition cost approximately $1 million in taxpayer funds.[15]

From: Tinker, Lenny
Sent: Wednesday, August 29, 2018 9:48 AM
To: Ulrich, Elaine [redacted]>; Jones-Albertus, Becca [redacted]; Kane, Victor [redacted]>; Gay, Charlie [redacted]>
Subject: *RE: SETO FOA Topic 1 Cancellation Notice - Federal funds already expended*

Hi Elaine, (b) (5) 'Reviewer compensation alone was almost this much and during the FOA meeting, we were estimating several person years of DOE staff and contractors (giving a total closer to $1M of federal fund expenses).

Victor: Based on your prior workload analysis, (b) (5) 'I think it is important to clarify to total federal funds already expended on this topic that had prior approval in this administration.

-Lenny

DOE disputes this estimate, saying it spent closer to $80,000 on the full review process. However, this estimate only includes payment for the external, nonfederal peer reviewers and does not include staff time and resources as well as reviewer recruitment and workshops.[16] Further, neither estimate captures the invaluable time and resources spent by applicants who submitted lengthy proposals packed with technical information.

Committee Concern: Impact on Applicants

Typically, once a FOA has been announced, applicants first submit a letter of intent and a concept paper outlining the proposed research project. EERE reviews and provides preliminary feedback on these concept papers and either encourages or discourages applicants to submit full applications.

Applicant teams usually spend 3 to 4 weeks developing a 2 to 5-page concept paper that addresses the technical requirements and priorities detailed in the FOA. The size of these teams varies, depending on factors such as whether a university has partnered with a private company or national lab. Committee Staff spoke with several applicants that estimated their teams ranged from 4 to 8 members, with each person spending 3 to 5 hours per week to develop one concept paper. Occasionally, EERE asks clarification questions after receiving concept papers and applicants have 2 to 3 days to respond. Agency documents indicate that 367 concept papers from 275 unique applicants were received under Topic 1.

If an applicant receives an encouragement letter from EERE, developing a full proposal is a much heavier lift, as it contains both the technical and financial aspects of the project. One applicant estimated it takes about three times as much work to develop a full application in comparison with the concept paper. Additional experts may be added to a team to absorb the increased workload. Several applicants confirmed that it is very time consuming to form a team and prepare a competitive proposal. Agency documents show that 92 unique applicants submitted full applications under Topic 1.

Committee Staff spoke with several applicants who received the notice of cancellation on August 31, 2018 who were frustrated and upset by what they saw as a confusing decision that DOE never adequately explained to them. As outlined above, applicants had anticipated that they would be notified of their status as finalists just a few days later, around September 3. One applicant felt that the email they received on August 31 was not clear that DOE was canceling the FOA and replacing it with a new one. Another applicant said they never heard from DOE that the FOA had been cancelled, and only found out about it through colleagues in the field several months later. Several applicants were perplexed by the cancellation after they had invested so much time in developing applications. One applicant told Committee Staff that it felt like a waste of everyone's time writing and submitting the proposal only to be told so late that the program would not move forward in its current state.

Committee Staff are concerned that this episode threatens DOE's ability to attract the most meritorious research partners for future opportunities. The cancellation of this FOA so far into the award process may have resulted in tens of thousands of wasted workhours by the solar power researchers that this program is supposed to support. If potential grantees do not think that DOE is a reliable partner or doubt that the competitive process is fair, they are less likely to

engage with DOE in the future.[17] Former senior DOE officials told Committee Staff that EERE is always working in competition with foreign governments, who are in aggressive pursuit of R&D partnerships with American companies and university researchers who could deliver them an edge in energy innovation.

Committee Concern: External Merit Review

The purpose of merit review in DOE competitive grant-making is to provide an independent assessment of the technical merit of an eligible and responsive application for financial assistance. In a typical process, merit reviewers will meet in person near the end of the competitive phase to discuss the final scores, strengths, and weaknesses of each application and evaluate applications against the formal Merit Review Criteria defined in the FOA. The merit reviewers will make their recommendations for which proposals should receive grant awards to EERE officials, who then make final selections.

Agency documents suggest that DOE engaged 30 expert panelists to conduct the merit review of the original FY18 SETO FOA. The in-person peer review process for the 2018 SETO FOA took place in mid-August 2018. Agency documents suggest that unfortunately, the decision to rescind Topic 1 had already been made and set in motion by DOE political officials well before this time. But external reviewers that spoke with Committee Staff did not recall any discussion with DOE at the peer review sessions that indicated Topic 1 would be eliminated or handled differently than usual. The reviewers' time in reviewing Topic 1 submissions was wasted, and it is highly likely that the officials who were directing the re-issuance of the FOA would have been aware of that before the fact.

Committee Staff are concerned that this decision to cancel a FOA so late in the process threatens the trust of DOE's expert reviewers. While it is appropriate for DOE to make changes to funding opportunities in some cases where new and unexpected external circumstances require such changes – a condition that has not been met in this particular case – such a significant shift should always be made in a manner that minimizes the potential to waste expert reviewers' time.

Several former senior staff for DOE emphasized to Committee Staff how challenging it can be to build and maintain an experienced cohort of external reviewers who are willing to answer the call when DOE reaches out for their assistance. As outlined in the Departmental Merit Review Guide, external review panelists are to be senior technology experts in their specified fields. DOE seeks to prioritize reviewers with advanced degrees, memberships in key societies such as the National Academies of Science, and a record of publications and patents related to the technology being evaluated.[18] These kinds of candidates tend to have many demands on their time, and many potential candidates are ineligible to participate as a reviewer because they may be part of a team of applicants themselves.

Committee Staff are also concerned that the external reviewers for the original FOA were not reimbursed for their services in a timely fashion. In general, external reviewers are reimbursed for their accommodations and travel to in-person reviews in addition to a modest honorarium for their contributions. Agency documentation shows peer reviewers for the original 2018 SETO FOA were frustrated that they did not receive reimbursement or honoraria as expected for several

weeks after paying out of their own pockets to travel to Washington D.C. for the in-person reviews.

From: Fricker, Kyle
Sent: Thursday, August 30, 2018 9:12 AM
To: DL-EERE-4S PMsolar <[redacted]>
Subject: SETO FOA - Honorarium Delays

Hi all—

I want to bring to everyone's attention the issue of honorarium delays for our reviewers. We have 120+ reviewers for the FOA, and it is my understanding that most or all have not received payment. Most of them had to pay hundreds to a thousand dollars or more to travel to our merit review meetings 2-3 weeks ago (and likely expended the money on flights/hotels well over a month ago). Some of them work for nonprofits or governmental organizations and do not have the resources to be in the holding pattern they now find themselves in.

I just want to make sure we are doing everything we can to get them paid as fast as possible. I have multiple upset reviewers for my panels and I am sure the other FOA leads have the same. I wouldn't want this experience to sour the reviewers experience and make them less likely to accept the invitation in the future.

Thanks for your attention to this,

Kyle

Kyle J Fricker, PhD
Solar Energy Technologies Office

These delays were ultimately resolved, but it is unfortunate that DOE apparently fumbled this important administrative matter on the same occasion of the cancelled FOA. A healthy merit review process for the highly technical topics that EERE funds is only possible if DOE can cultivate and maintain good working relationships with the most qualified external partners. These types of missteps threaten DOE's ability to steward the agency's many critical responsibilities.

Conclusion

EERE SETO and its predecessor programs at DOE have played a major role in advancing solar energy technologies from their earliest iterations in the late 1970s. They have helped deliver a competitive innovation edge to the United States that requires steady vigilance to maintain amidst robust international competition. To continue this commendable legacy of success, it is vital that DOE's innovation mission remain independent of political interference and respectful of the time and money that prospective agency partners and stakeholders invest in order to work with EERE.

Timeline of Events

April 17, 2018: DOE issues the FY18 SETO FOA (DE-FOA-0001840)

May 9, 2018: Deadline for the FY2018 SETO FOA Concept Papers

July 5, 2018: Deadline for the FY2018 SETO FOA Full Applications

July 30, 2018: Then-Acting Assistant Secretary for EERE, Cathy Tripodi, emails officials in DOE's Office of Electricity expressing her intent to rewrite Topic 1 of the FY2018 SETO FOA

Mid-August: In-person external merit review of the FY2018 SETO FOA applications occurs

August 31, 2018 2:37 pm: Staff from DOE's Office of the Chief Financial Officer email House Appropriations Staff to advise them that DOE would soon be sending out a notice of cancellation for Topic 1 and introducing a new FOA to be announced at a later date

August 31, 2018 3:00 pm: EERE posts a Notice of Intent for the new ASSIST FOA (DE-FOA-0001987) to replace Topic 1 of the FY2018 SETO FOA

September 3, 2018: Per the schedule outlined in the FY2018 SETO FOA, DOE had anticipated announcing award finalists by this date

September 10, 2018: Democracy Forward submits a Freedom of Information Act request to DOE for documents related to the FY2018 SETO FOA

October 15, 2018: DOE issues the ASSIST FOA (DE-FOA-0001987) with similar topic areas to the original Topic 1 but with two subtopics instead of four

October 25, 2018: Democracy Forward files a lawsuit in District Court for the District of Columbia to compel DOE compliance with its request for documents under FOIA

March 25, 2019: DOE announces 10 awardees for the re-written ASSIST FOA

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[11] Email from Mr. Yuan to Ms. Bobo on Thursday, September 6, 2018 at 1:33 PM.
[12] Email from Mr. Timothy Unruh to himself on Monday, September 10, 2018 at 4:53 PM.
[13] Email from House Appropriations Committee to former Chief Financial Officer, Mr. John G Vonglis, on Friday, August 31, 2018 at 8:12 PM. In addition, email from Mr. Vonglis to the current Director of Budget, Mr. Christopher Johns, and the former Associate Director for External Coordination, Ms. Bridget Forcier on August 31, 2018 at 8:19 PM.
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REPORTS SUBMITTED BY ARJUN KRISHNASWAMI,

NRDC

NOVEMBER 2019
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REPORT

TRANSFORMING THE U.S. DEPARTMENT OF ENERGY IN RESPONSE TO THE CLIMATE CRISIS

Legislative Authorization Principles for Clean Energy Innovation

An NRDC Report by Tarak Shah, with Arjun Krishnaswami

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Executive Summary

The climate crisis requires bold, comprehensive, and immediate action at every level of government around the world. In the United States, any comprehensive climate plan must include policies to revamp and expand clean energy innovation programs. As the nation's largest public funder of clean energy research, development, and demonstration, the U.S. Department of Energy (DOE) will be a critical player in such a plan. DOE takes its long-term direction and authority from Congress in the form of periodic authorization legislation. Unfortunately, DOE's clean energy innovation programs are relying on a congressional mandate that has not been comprehensively updated since 2005 and does not reflect the urgency of the climate crisis or the full array of technologies and innovation strategies available.

Congress urgently needs to update DOE's authorizing legislation to target federal resources to address climate change, as well as ensure that the United States is a global leader in renewable energy, energy efficiency, clean industry and manufacturing, transportation, and grid modernization. Doing so will not only help the nation address climate change and avoid health-damaging air pollution, but also help create millions of well-paying jobs—such as solar panel installers, energy efficient appliance manufacturers, and electric vehicle factory workers—to add to the more than 3 million existing jobs in the clean energy economy. If DOE's mandate is not updated, the United States risks falling behind in the global clean energy revolution and missing out on its enormous economic and environmental opportunities.

DOE CANNOT ADEQUATELY ADDRESS THE CLIMATE CRISIS WITH ITS CURRENT MANDATE

Congress provides long-term direction to DOE through authorizing legislation. This legislation, which can come as a singular comprehensive package or multiple laws covering individual programs, defines the technology areas that DOE can work on, sets its mission and goals, enables funding for department activities, and determines its operating structures. Authorizations also define the strategies and tools available to DOE and can create new programs to expand its capabilities.

DOE has a history of success in accelerating clean energy development. For example, DOE programs have led to breakthroughs in renewable energy technologies, helped expand the clean energy workforce through training curricula, and saved energy and money for millions of Americans through appliance standards. DOE is still capable of similar successes and should continue to maximize clean energy development under existing authority, but the department will not reach its full potential without a comprehensive rewrite of its authorizing laws.

DOE's clean energy programs are underfunded and organized ineffectively to address the climate crisis. For example, DOE's investments in the various energy-using sectors are not well aligned with the distribution of U.S. greenhouse gas (GHG) emissions, nor do they adequately address the most difficult technological challenges of decarbonization. In particular, as of 2016, only 10 percent of DOE's research investments were in the building and industrial sectors, whereas the U.S. Environmental Protection Agency estimates that these sectors are responsible for 34 percent of the nation's overall GHG emissions.

Beyond funding levels, mandates for the applied energy offices—which include the programs that cover transportation, industrial, and building energy technologies—are outdated and do not align with the most promising opportunities for and significant barriers to addressing climate change. For example, eliminating emissions from industrial processes and manufacturing plants will require innovative technologies such as carbon-free fuels, improved electric heating, and carbon capture and storage, but the Advanced Manufacturing Office, which is responsible for most of DOE's work in the industrial sector, is authorized to address only energy efficiency.

Updated authorizing legislation could align the long-term direction of the applied energy programs with the world's most pressing climate and energy challenges by updating technology priorities and authorizing more funding for DOE programs. Without a new mandate, the agency cannot make the transformative institutional changes that are necessary to address the climate crisis.

CONGRESS SHOULD AMEND DOE'S AUTHORIZING LAWS

This report identifies areas in which the current DOE authorization falls short of urgent clean energy innovation needs, and it provides specific recommendations for amendments. The first set of recommendations covers department-wide gaps and falls into three categories.

- Funding for DOE programs must be increased to match the scale of the climate crisis, and the structure of the department should be updated. Congress should, at a minimum, double funding for DOE's clean energy research and development programs in the next 5 years and significantly increase demonstration and deployment funding. At the same time, Congress should restructure the Office of Energy Efficiency and Renewable Energy (EERE) to expand the transportation, building, and industrial sector efforts and elevate them within DOE's structure. Furthermore, DOE programs would be more effective with requirements for long-term planning processes and establishment of an Under Secretary for Science and Energy to integrate work across offices. Career technologists should be at the helm to depoliticize management of DOE programs.
- Congress should align the mission and goals of DOE with the critical challenges facing the nation's energy systems. Authorizing legislation should expand DOE's mission to include mitigating climate change and building climate resilience. Congress should also ensure that every applied energy office incorporates workforce development programs and social equity considerations into its efforts. Each office should be required to consider how its technology solutions interact and integrate with the electricity grid.
- Congress should expand DOE's existing tools and ensure they are being used effectively. Authorizing legislation should create a central funding mechanism for crosscutting initiatives that span multiple energy offices. Demonstration and deployment programs should be significantly expanded. Congress should also authorize DOE's use of incubators, accelerators, prizes, and challenges—which are currently limited in scope and funding—as tools to commercialize clean energy technologies.

The second set of recommendations covers challenges specific to each of the programs in EERE and the Office of Electricity. EERE and Office of Electricity programs, which coordinate and distribute funding for specific clean energy technologies such as solar energy, building efficiency, and clean vehicles, are relying on outdated congressional mandates that do not account for new technological challenges and opportunities. Note: the scope of this report does not cover major parts of DOE, including the Office of Fossil Energy, the Office of Nuclear Energy, and the agency's non-innovation activities.

DOE will be crucial in addressing climate change and ensuring U.S. technological leadership, but it is operating under a vastly outdated model. Congress must update DOE's authorizing legislation or put at risk the enormous economic and environmental benefits of a clean energy future.

Introduction

There is no silver bullet solution to the climate crisis. Addressing it will require total, rapid transformation of global energy systems, including increasing energy efficiency and zero-emission power generation at record pace, electrifying buildings and transportation systems to replace fossil fuel use, and transitioning industrial processes to be carbon neutral. To achieve this humanity-saving transformation—and to do so in a just, equitable way—the world needs a transformative, comprehensive set of policy and technology solutions. Technologies that are already market tested can get us almost all the way there, but those we have yet to commercialize will get us there more cheaply and rapidly and with greater benefits for more people.

Energy technology innovation—including research, development, demonstration, and deployment (RDD&D) programs—will be a critical piece of any comprehensive climate solution. Research and development (R&D) programs work to build new technologies and improve existing ones, demonstration programs put those technologies to the test in real-life applications, and deployment programs channel investment to move the technologies into the market. Each step of the innovation process is crucial to building the necessary technology solutions to combat climate change.

Governments around the world have a principal role to play in catalyzing energy RDD&D. Countries that take decisive, nationwide action, including a commitment to energy innovation, will set themselves up to lead the global response to climate change while also ushering in a new age of prosperity. Moreover, well designed and executed public innovation programs can help ensure an equitable clean energy transition by bringing safer, healthier, cleaner technologies to more people and creating technologies that can be applied in diverse situations.

As the world's largest public funder of clean energy R&D,[1] the United States has a head start. Thanks to decades of federal energy research and investment, which the private sector is now commercializing, more than 3 million Americans are employed in clean energy jobs,[2] and our health has improved as new energy technologies have cut air pollution from the power sector.[3]

Congressional authorization language for the Department of Energy (DOE) that was last comprehensively updated in 2005 governs the federal government's work in this space.[4] So much has changed since then.

We have made significant progress; with support from DOE, the costs of wind and solar power, batteries, and light-emitting diode (LED) light bulbs have each been cut by at least 75 percent, and in the case of LEDs, have dropped by 95 percent.[5] However, new energy technology challenges are emerging—and for those who can overcome them, enormous benefits await. For example, the electricity grid faces a growing need for long-duration energy storage, a problem that technology has only begun to tackle. Cutting emissions from large industrial facilities, heavy-duty transportation (planes, trucks, ships), and natural gas use in buildings remains difficult. The next generation of clean energy technologies—whether floating offshore wind turbines, perovskite solar panels, long-duration storage, or zero-carbon fuels for use in industrial facilities—could dramatically reduce the costs and accelerate the pace of the clean energy transition.

Meanwhile, since 2005, humans have added the same quantity of greenhouse gas (GHG) emissions to the planet as we did in the first 220+ years for which we have accurate estimates.[6] As a result, we are experiencing major effects from climate change—record heat, strong storms, flooding, wildfires, water scarcity, and disease, to name some. Because of DOE's dominant role in driving technology innovation and deployment in the energy sector, Congress urgently needs to update the authorization for DOE as part of a larger reevaluation of the federal government's responsibility and authority to respond to climate change.

This report develops several recommendations to guide Congress in such an effort. These recommendations focus on DOE's science and energy offices, with an emphasis on a subset of the applied energy offices; the scope of the report does not include efforts related to the Federal Energy Regulatory Commission and several major DOE programs and offices, including nuclear security and environmental management.

The first set of recommendations pertains to DOE generally, and the second set focuses on the individual technology offices within DOE's Office of Energy Efficiency and Renewable Energy (EERE) and Office of Electricity. Reauthorization bills for the Office of Nuclear Energy and the Office of Fossil Energy have already been introduced this Congress, but bills for only some of the technology areas within EERE and the Office of Electricity have been introduced. Our recommendations attempt to fill the gap.

DOE is one of the key federal agencies that should be addressing climate change. Implementing these recommendations would update outdated authorities and improve the U.S. response to the climate crisis. Congress should develop and pass this authorizing legislation as soon as possible.

Section I: Department-Wide Recommendations

This section lays out recommendations for overarching changes to DOE in three categories: funding levels and structure, mission and goals, and mechanisms and tools.

INCREASE FUNDING AND MODERNIZE DOE'S STRUCTURE

DOE is underfunded and organized ineffectively to respond to the climate crisis. Addressing these challenges is a crucial first step to ensuring that DOE can tackle causes and effects of climate change in the energy sector.

Increase Funding for R&D

Low-carbon energy research can lead to technological advances that reduce the costs and increase the pace of the transition to clean energy—and has done so in the past. For example, thanks in part to decades of DOE investment, the costs of wind and solar power, lithium-ion batteries, and highly efficient LED light bulbs have been cut by at least 75 percent and, in the case of LEDs, by 95 percent.[7] As a result, these technologies have expanded rapidly to replace older, more-emissions-intensive products. In addition, analysis shows that federally sponsored energy R&D generates huge returns to the U.S. economy; a 2017 evaluation of the DOE's Office of Energy Efficiency and Renewable Energy showed that $12 billion of taxpayer investment yielded more than $388 billion in net economic benefit.[8] Taken together, these facts create a powerful argument for substantial new investments in energy research. Although yearly appropriations bills that Congress passes establish research funding levels, authorization legislation can signal Congress's long-term intent to prioritize R&D. Without a significant increase in investment, the United States is likely to be surpassed as the global clean energy technology leader, and the cost of cutting emissions from the U.S. energy system is likely to rise significantly.

Recommendation: As part of a holistic set of research, policies, and deployment tools to address our energy needs and the challenges of climate change, Congress should authorize and appropriate funding over a 5-year period that at least doubles clean energy research and development investments, 75 percent of which are at DOE, and significantly increases demonstration and deployment funds at the federal agencies.[9]

Update Organizational Structure

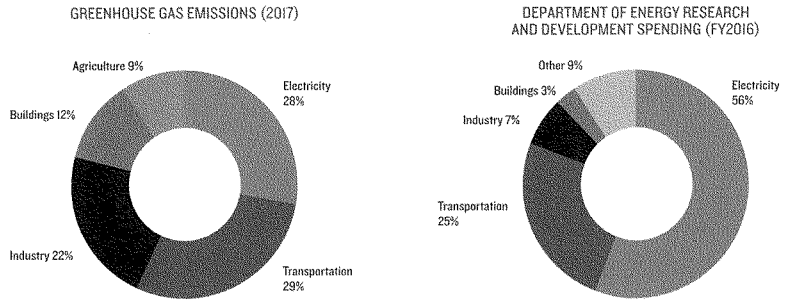
DOE can better address our national energy and environmental needs by improving coordination between its basic and applied energy science programs and within the applied energy science programs. DOE's basic

science programs are generally located in the Office of Science. Its applied energy programs consist of the Advanced Research Projects Agency—Energy, EERE, the Office of Electricity, Cyber Security, and Emergency Response, Indian Energy, Nuclear Energy, Fossil Energy, and the Loan Programs Office. From 2013 to 2017, these programs were integrated through the Office of the Under Secretary for Science and Energy, which led the Quadrennial Technology Review (a complete review of the most promising RDD&D opportunities for clean energy technologies) and helped convene staff from across DOE programs to collectively address crosscutting initiatives such as grid modernization, the energy-water nexus, advanced computing, and subsurface energy sciences.[10] Although some of the crosscutting teams still exist, others fell apart under the 2017 reorganization that split DOE's basic science and energy programs between two undersecretaries (Under Secretary for Energy, Under Secretary for Science).

A single under secretarial office, with responsibility for overall stewardship of the basic science and energy programs, their budgets, the laboratories associated with these programs, and crosscutting energy research, will help DOE more thoroughly integrate its energy RDD&D efforts and respond quickly to national needs.

Recommendation: Establish a single Under Secretary for Science and Energy, with the offices of Science, Buildings and Manufacturing (currently Energy Efficiency), Sustainable Transportation, Renewable Power, Fossil Energy, Nuclear Energy, Electricity, Cyber Security and Emergency Response, Indian Energy, Technology Transitions, and Loan Programs as direct reports.

FIGURE 1: U.S. GREENHOUSE GAS EMISSIONS AND DEPARTMENT OF ENERGY RESEARCH, DEVELOPMENT, DEMONSTRATION, AND DEPLOYMENT SPENDING ACCORDING TO SECTOR[11]



Balance the Portfolio

The DOE's energy R&D activities are concentrated in the power sector, which is not surprising given DOE's historic roots. (DOE traces its lineage to the Manhattan Project and the Atomic Energy Commission's efforts to develop nuclear power.) As of 2016, more than half of DOE's energy research investments were in the power sector, approximately one-quarter in the transportation sector, and only 10 percent in the buildings and industrial sector combined.

This mix is poorly aligned with the opportunities to mitigate GHG emissions in today's economy (Figure 1). Transportation overtook the power sector as the largest source of U.S. GHGs in 2016. The Environmental Protection Agency estimates that U.S. industry is responsible for approximately 22 percent of our overall GHG emissions, with the buildings sector is responsible for another 12 percent. These estimates exclude emissions from electricity usage, which is listed separately.

Although there are myriad research offices to address power sector emissions (DOE offices of Nuclear Energy, Fossil Energy, Electricity, EERE Renewable Power), more funding and greater attention is required in the transportation and buildings and industrial sectors.

Recommendation: Triple funding for DOE's Sustainable Transportation and Energy Efficiency portfolios over the next 5 years, rename the Energy Efficiency Portfolio to Buildings and Manufacturing to better encompass its research focus, and elevate the offices of deputy assistant secretaries for Sustainable Transportation and for Buildings and Manufacturing to the role of assistant secretary. This would in effect split EERE into three assistant secretary offices (including an Assistant Secretary for Renewable Power), which is appropriate given the size of this office and the variety of challenges its technology programs address.

Require Long-Term Portfolio Planning

Many DOE technology programs conduct future planning through 5-year program plans that provide a broad overview of energy use in the program's energy sector; opportunities for and barriers to cost-effective energy savings; and the programs' strategies, research pathways, and goals for achieving improvements in the relevant energy sector. Drafting these plans is a scientific community-wide process that engages DOE headquarters staff, national laboratory personnel, and the scientific and industrial communities. In September 2018, through Section 204 of H.R. 589, the DOE Research and Innovation Act, Congress formally required DOE to undergo a larger department-wide program portfolio planning effort performed every 4 years. DOE has not identified what steps it is taking to comply with this requirement.

The portfolio planning process should incorporate program-level plans into a unified document that connects future RDD&D needs with future funding requirements and assesses budgetary priorities within the portfolio. While H.R. 589 codified a department-wide planning process, it did not require program-level multiyear planning. A model for such a process already exists. In 2011 and 2015, DOE began a department-wide portfolio planning process through the Quadrennial Technology Review, which assessed the status of energy technologies. DOE chose not to undertake the QTR for 2019.

Recommendation: Codify the requirement for program-level multiyear planning and ensure that DOE is appropriately executing the H.R. 589 requirement for department-wide portfolio planning that assesses the status of technologies, future RDD&D needs, associated budget requirements, and common metrics for measuring performance tied to national environmental goals, including GHG emissions reduction and resilience to climate change.

Implement Structures to Depoliticize DOE

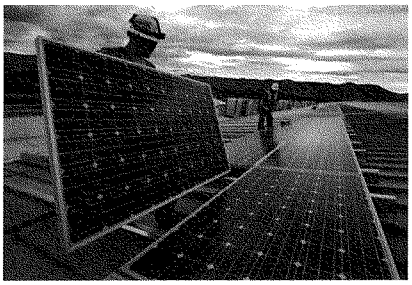
DOE has historically been an apolitical department, guided by the principles of the scientific method and peer review, but creeping politicization of the department is underway as political appointees replace career managers and the department pursues an antiscience, pro-fossil fuel agenda.

Specifically, the department installed its first-ever politically appointed Deputy Assistant Secretary in EERE in 2019, followed weeks later by its second.[12,13,14] In addition, the Trump Administration's antiscience agenda has permeated the agency in other ways over the past 2 years, including through the proposal to bail out coal and nuclear plants and the illegal rollback of energy-saving lightbulb standards.[15,16]

Politics should not interfere with science-based decision-making. Congress can reestablish the preeminent role of science at DOE by requiring that assistant secretaries and deputy assistant secretaries be career officials hired from the Senior Executive Service (SES) corps, a government-wide pool of high-performing individuals selected for their leadership qualifications that includes the government's best technical and scientific managers. The SES regularly recruits private sector leaders who do not have prior government experience.

Career assistant secretaries can help ensure that DOE political appointees who lead the department (secretary, deputy secretary, under secretaries) conform to the law, apply best practices for science- and merit-based research decision-making, and are well informed by DOE career staff, who are some of the world's leading scientists and technologists—regardless of who is president. Doing so would also promote long-term stability by maintaining senior leadership through presidential transitions. Assistant secretary positions have sat vacant for years awaiting a presidential appointment or Senate confirmation, preventing programs from implementing their missions and performing research.

Recommendation: Require that members of the career SES fill DOE assistant secretary and deputy assistant secretary positions.



UPDATE DOE'S MISSION AND GOALS

DOE's statutorily authorized mission and goals have not substantially changed since 2005, but collective knowledge about the pace and effect of climate change has dramatically expanded since then. Several recommendations follow to authorize DOE to address climate change and other important energy-related national goals.

Make Addressing the Causes and Effects of Climate Change an Explicit Goal

Section 902 of the Energy Policy Act (EPAct) of 2005 establishes "decreasing the environmental impact of energy-related activities" as one of five goals for DOE research.[17] This is an important but vague goal that mentions neither GHG emissions nor climate change. Given the urgent challenges associated with global climate change, more statutory specificity about the environmental goals for DOE's research is necessary.

Making reduction of GHG emissions and the effects of climate change explicit goals of department activities will give DOE personnel more freedom to pursue necessary research, regardless of the ideological leanings of any particular administration. The absence of these specific goals has led DOE career staff and applicants for DOE research funds to self-censor themselves in research proposals to better align with the current administration's antiscience agenda.

Beyond issuing grants, DOE also has limited, but influential, rulemaking authority. Most notably, DOE sets minimum efficiency standards for energy-consuming appliances and devices, which it bases on a comparison of the costs and benefits of any rule. Accounting for the price of GHG pollution that comes from using such appliances and devices would better capture the true costs of our energy use and support higher efficiency standards, but because DOE is not explicitly tasked with lowering GHG emissions and accounting for climate change, the law does not mandate that DOE include these costs.

Recommendation: Update DOE's authorized goals to state that it should research, develop, demonstrate, and commercialize technologies that "decrease the environmental impact of energy-related activities, including by deeply reducing greenhouse gas emissions" and "improve energy-sector resilience to climate change" and replicate this authorization language in each technology subsection of a legislative authorization. Congress should also require cost-benefit analyses for department rule-making to determine the economic harm of climate effects.

Make Improving U.S. Clean Energy Manufacturing Competitiveness an Explicit Goal

Over the past few decades, several technologies that DOE has fostered have left the laboratory and entered the market with great success, including solar panels, wind turbines, grid-scale batteries, and LED light bulbs. In each case, DOE has supported the initial development of the technology and subsequent innovations in manufacturing these products to reduce costs.

As the U.S. economy continues to transition to clean energy, we must ensure that the manufacturing, construction, installation, operation, and maintenance of clean energy technologies drive economic development and employment in the United States. Moreover, clean energy manufacturing capacity will need to expand significantly to deploy clean energy technologies at the pace required to address climate change, representing a golden opportunity to revive the domestic manufacturing economy and the U.S. industrial sector.

DOE has sponsored programs to increase U.S. manufacturers' competitiveness. For example, the Innovation in Manufacturing Competitiveness program in the solar energy office funds projects that are helping rebuild the solar module industry and supply chain in America. The Advanced Manufacturing Office pursues a large variety of programs to do the same, including through the Manufacturing USA Institutes, which is a national network of federally sponsored manufacturing institutes, each with its own technological concentration but designed to accelerate U.S. manufacturing as a whole. Before it expired, the 48C Advanced Energy Manufacturing Tax Credit program helped deploy domestic manufacturing of clean energy equipment.

DOE can and should do more to encourage manufacturing innovation, including workforce development (see Workforce Development recommendations), federal support for developing manufacturing innovation ecosystems, and more financial incentives for domestic clean energy manufacturing.

Under a provision of the Bayh-Dole Act, EERE requires award applicants to submit U.S. manufacturing plans, which state their commitment to manufacturing technologies resulting from DOE awards in the United States.[18] Congress should ask DOE to strengthen this requirement by applying it to all applied energy RDD&D (not just EERE), including loan guarantees from the Loan Programs Office, and to develop recommendations for strengthening proposed manufacturing plans.

Recommendation: Make increasing the manufacturing competitiveness and export of clean energy technologies an objective of DOE research. Congress should also develop and fund a broader suite of tools to increase the competitiveness of U.S. clean energy manufacturing, including by reauthorizing the 48C Advanced Energy Manufacturing Tax Credit with an updated definition of qualified clean energy technologies. Finally, Congress should require U.S. manufacturing plans for all DOE-funded applied energy research.

Promote Grid Integration in All Programs

Given the increasing market penetration of renewable energy and energy efficiency technologies, all DOE applied research programs should consider the effect of their technologies on the electric grid.

The Office of Electricity leads DOE's electric grid research, but other energy technologies can have significant effects on the strength, security, and resilience of the grid and the ability to achieve a zero-GHG-emission grid. For example, although the Office of Electricity manages R&D for electric grid hardware and software, many EERE programs have implications for grid modernization and can make significant contributions related to their technology areas (e.g., increasing penetration of renewables on the grid, using energy efficiency to help balance the grid, integrating electric vehicle (EV) charging into the grid). Therefore, programs outside the Office of Electricity should also be authorized to support grid RDD&D. This additional authorization would supplement the excellent cooperation that already exists between EERE and the Office of Electricity through the Grid Modernization Initiative. (See Crosscutting Technology Initiatives recommendation.)

Recommendation: Include grid integration as a consideration for all fossil energy, nuclear energy, efficiency, and renewables programs and all relevant transportation research programs.

Prioritize Equitable Energy and Climate Justice Solutions

Climate change and energy-related pollution have unequal and disproportionate effects on historically marginalized communities and low-income households. Moreover, communities of color and low-income communities spend a disproportionate portion of their income on energy expenses and are disproportionately likely to experience energy poverty.[19,20] Relatedly, these communities have experienced less than their fair share of benefits from clean energy technologies thus far.[21]

In addition to the important work DOE's Office of Weatherization and Intergovernmental Programs is doing to fund energy efficiency retrofits for low-income families across the country, DOE should pursue important energy technology RDD&D topics to bring marginalized communities to the forefront of the energy transition and reduce inequities in energy burden. These opportunities include community solar (solar projects that are shared among several households to address the siting and ownership challenges of solar adoption), affordable electric and carbon-free transit infrastructure, energy efficiency solutions for rental and multifamily housing, and transition funds and programs for communities dependent on fossil fuel extraction. These kinds of equitable deployment research topics deserve greater attention from DOE, which can provide technical assistance and grants to states and municipalities.

The department should also develop and implement frameworks to consider energy and climate justice criteria when prioritizing research and evaluating relevant award applications. As part of this work, DOE should consider the impacts of fossil fuel development in historically marginalized communities and prioritize investments that help alleviate these impacts. Finally, it should include frontline communities and marginalized communities in the review process for awards to better reflect the needs and outcomes that will serve these communities.

Recommendation: Include equity and energy justice as an objective of all applied energy research programs and authorize and fund specific programs to address the energy needs of low-income and other historically marginalized communities, including by strengthening representation of underrepresented and affected communities in the clean energy workforce. Direct DOE to develop frameworks for considering energy and climate justice criteria into planning processes and award decisions. Explore ways to include marginalized communities early in the research process.

Improve and Expand Workforce Development

Congress must ensure that the United States has a trained workforce to research and deploy clean technologies.

DOE and its predecessor organizations have a longer than 60-year history of commitment to training and supporting scientists, mathematicians, engineers, and operators. The Office of Science considers cultivating the next generation of scientific talent to be an important part of its mission and has developed robust training and support programs for students and researchers to do so. Through the Office of Science, DOE's role in workforce development has primarily focused on support of undergraduates, graduate students, and postdoctoral researchers through R&D awards at universities and DOE national laboratories. Today, that role also includes supporting educational and training programs to promote science and energy literacy.

Workforce development programs in the applied energy programs are more limited. Where implemented, programs such as the Solar Instructor Training Network and the Collegiate Wind Competition have been successful in training the next generation of clean energy professionals.[22] More programs like these are needed to teach and train clean energy workers for both research and deployment job opportunities. Programs that provide crosscutting skills in topics such as clean energy manufacturing, robotics, artificial intelligence, and green construction will also be required. Such training programs should be conducted in partnership with industry to provide a clear pathway to job placement. In addition, these programs should be coordinated with other agencies, including the National Science Foundation, the Department of Labor, and the Department of Education. Finally, DOE workforce development programs must include diversity and inclusion as key criteria.

DOE produced the *U.S. Energy and Employment Report*, which offered detailed energy and employment data and supplemented Bureau of Labor Statistics employment data, through 2017. This analysis was found nowhere else, making it an invaluable tool for policy makers, academic officials, and business executives to assess our current clean energy workforce and project future need. DOE stopped producing the report in 2017, in a harmful move that removed an important source of official information on the clean energy economy.

Recommendation: Authorize comprehensive workforce development programs for all applied energy programs, allowing DOE technology programs to develop tailored workforce and education programs that respond to current and future needs in their technology areas. In addition, codify the requirement for DOE to produce the U.S. Energy and Employment Report.

Use Social and Behavioral Science to Increase Clean Energy Adoption

Supporting and investing in technological development is only part of the solution to our energy challenges. Some of our clean energy solutions require people to change decisions they make every day. For example, we may need to adjust how and when we use our household appliances to maximize the effectiveness of renewable energy. It is important that we understand why some energy technologies are embraced more readily than others.

DOE has conducted social and behavioral science in the past. For example, DOE supported research on smart and connected appliance use, which helped manufacturers and utilities design more viable products and programs to help consumers save energy, but there are many additional research areas in this field that could generate new information about effectively reducing GHG emissions.

Recommendation: Authorize DOE to research social and behavioral factors that influence energy consumption and acceptance and adoption rates of new energy technologies.

EXTEND DOE'S EFFECT WITH NEW RESEARCH MECHANISMS AND TOOLS

Research mechanisms and tools developed in the last decade-plus have not been codified in law. These approaches represent new, effective ways to use innovation funding efficiently. Several recommendations follow to ensure that DOE has continued access to them.

Support Crosscutting Technology Initiatives

Energy topics that span multiple DOE program offices are known as "crosscuts." They include the energy-water nexus, grid modernization, subsurface technology and engineering, advanced materials for energy, supercritical carbon dioxide for power generation, exascale supercomputing, cybersecurity, advanced manufacturing, and energy storage. Individual program offices propose, fund, and lead research topics within these initiatives. To varying degrees, program managers who work in these areas have organized to discuss relevant research findings from other programs, potential topics for future research, and ways they can reduce redundancy and improve collaboration.

The Office of the Under Secretary for Science and Energy previously coordinated these teams. When the Trump Administration eliminated that office in 2017, some of these teams dissolved, whereas others, such as the Grid Modernization Initiative, continued to meet and propose joint investments. Given the complicated, cross-sector challenges associated with reducing GHG emissions in our energy system, these crosscutting topics are increasing in importance to our clean energy future, and these teams require revitalization and formalization.

In addition, several new crosscutting topics must be introduced to address gaps in DOE's portfolio. For example, DOE should create a new carbon dioxide utilization crosscutting initiative involving DOE's Office of Fossil Energy; Office of Science; Advanced Research Projects Agency-Energy; and the Advanced Manufacturing, Bioenergy, and Fuel Cells and Hydrogen Technology programs in EERE. As part of the Grid Modernization Initiative, or as a new effort, DOE should also establish a crosscutting initiative on power electronics, which holds promise for renewables, EVs, and the grid. DOE should also develop a crosscutting urban energy sciences initiative, drawing on its historical expertise in the fields of sensing, communication, and computation capabilities. Such an initiative could dramatically increase the efficiency, sustainability, and resilience of cities.

In fiscal year 2016, DOE supported more than $1.1 billion in crosscutting R&D in the areas listed above,[23] but these initiatives are funded out of individual program offices, instead of centrally. Because of the way Congress allocates funding, increasing funding in these critical crosscutting technology areas requires increasing funding in individual

programs. A new funding mechanism is needed that gives DOE greater flexibility to allocate R&D funding to crosscutting initiatives as needs emerge.

In September 2018, through Section 203 of H.R. 589, in recognition of their importance, Congress formally authorized the creation of crosscutting teams. In its authorization, Congress gave DOE the flexibility to create teams on the topics it deemed most important. DOE has not publicly announced whether it will use this authority to revitalize existing crosscutting programs or create new ones, nor has it detailed the organizational structure it will use to support the crosscutting teams.

Recommendation: Congress should ensure that DOE is implementing its September 2018 crosscutting authorization (Sec 203 of H.R. 589), charge the Under Secretary for Science and Energy with stewardship of the crosscuts, and create a central funding mechanism that the under secretary can use to strategically allocate additional funds to crosscutting topics and teams. Recommend $100 million in new central funding in the first year (appropriated with flexibility, similar to the manner in which Advanced Research Projects Agency-Energy is funded).

Make Technology Demonstration a Part of Applied Energy Programs

Technology demonstrations, in which a prototype or first-of-a-kind system is tested in one or more typical operational environments, are an important part of the research process. Conducting demonstrations helps identify system-level challenges, pinpoint areas for cost reduction, and validate the maturity of a technology. Technology demonstrations also reduce time to market for more efficient, cleaner technologies, which can give U.S. companies a competitive advantage.

Demonstration is an uncertain process, often requiring large investments with unclear outcomes. Over the years, DOE, in partnership with the private sector, has supported large demonstration efforts ($10 million-plus). Some of these supported technologies have been very slow to commercialize or failed altogether to find a home in the market yet generated important insights that have been built on in other arenas. For example, several large advanced cellulosic biorefinery facilities failed at the demonstration stage. These plants experienced adverse market conditions (low oil prices) but also a variety of technical challenges that are the subject of additional R&D.[24] Others led to spectacular successes. For example, three-dimensional printing prototyping at the DOE Manufacturing Demonstration Facility is revolutionizing how products are designed and built across the country.[25]

Given the uncertainty and financial investment involved, the private sector is often unwilling to take risks in this area, which is why it is essential that the government step in. Government support of demonstration (cost-shared with the private sector) helps identify what works and what does not, reducing risk and encouraging the private sector to commercialize new energy technologies.

Recommendation: Specifically authorize DOE's applied energy research offices to support technology demonstration and require inclusion of demonstration planning in multiyear program plans. (See Long-Term Portfolio Planning below.) Given the potentially large funding requirements and large yearly swings in funding characteristic of demonstration, Congress should also consider establishing a DOE demonstration fund separate from the individual technology office accounts and should authorize DOE to impose rigorous performance requirements on demonstration programs to ensure that they reduce investment risk and support commercialization.

Expand Deployment Programs

Although DOE is the primary federal funder of energy research, development, and demonstration programs in the United States, the Department of the Treasury leads the way on technology deployment through tax incentive programs. Given the urgency of the climate crisis, the federal government must signficantly expand deployment programs.

We have already recommended at least doubling energy research and development at DOE. For deployment, in addition to extending and expanding existing clean energy tax credits through the Department of the Treasury, Congress should increase DOE's role. This can be achieved by authorizing massive new cost-shared deployment programs at DOE, including programs to help innovative technologies bridge the late-stage "valley of death" (named for the financing hurdles and other challenges of expanding technologies from the laboratory to full-scale deployment) and programs to address market failures that create barriers to deployment of known technologies.

DOE has a successful history of implementing programs of this type, including through the American Recovery and Reinvestment Act of 2009, through which it invested more than $32 billion to support a wide range of clean energy projects across the nation—from investing in smart meter deployment to renewable energy programs, workforce development and training, and much more.[26] For example, $3.2 billion was delivered through energy efficiency and conservation block grants to develop, promote, implement, and manage energy efficiency and conservation projects that ultimately created jobs while reducing GHG emissions. This represented the largest nationwide direct investment in energy efficiency and renewable energy technologies at the community level in U.S. history.

DOE could consider a number of clean energy deployment tools, such as a green bank (an entity established to facilitate private sector investment in low-carbon technologies and infrastructure) that has the authority to issue debt (including bonds), equity, and insurance investments. Congress could also expand the DOE's loan authority to invest in more first-of-their-kind projects, including by expanding DOE's authority to pay credit subsidy cost fees for loan recipients. DOE could draw inspiration from recent proposals for major infrastructure bills for potential deployment programs to address climate change (including efficiency improvements for homes and schools, grid upgrades, and renewable energy installations).

Deployment programs are important strategies to reduce emissions, but they also can have significant social and economic impacts. DOE should include a poverty and social impact analysis when distributing deployment funding.

Recommendation: Congress should substantially expand existing clean energy deployment efforts (including tax incentives and financing mechanisms) and authorize new programs at DOE at the scale of investments made during the American Recovery and Reinvestment Act. H.R. 2741, the proposed Leading Infrastructure for Tomorrow's America Act, includes several energy deployment programs complementary to these principles. Congress should require rigorous performance measurement so that the most successful approaches can be replicated.

Support Incubators and Accelerators

Over the past decade, a robust network of energy technology incubators and accelerators has developed nationwide. Incubators and accelerators help provide start-up companies and nontraditional innovators with tools to research and commercialize energy innovations. These organizations provide innovators with access to funding, R&D facilities, mentorship, and connections to finance. Incubators and accelerators vary in their approach, creating an easy way to test and identify the best ways to support clean energy entrepreneurs.

DOE has directly supported these incubators and accelerators through funding and access to its facilities and experts (particularly at the national laboratories).[27] DOE has also developed its own incubator efforts through entrepreneurship programs such as Cyclotron Road. These programs embed private sector and academic scientists and engineers in the national laboratories, where they research future energy and manufacturing topics while learning entrepreneurial skills.[29] Some of these programs also provide national laboratory-based scientists with entrepreneurial training so that they better understand the clean energy marketplace.

With DOE's support, these incubators have helped develop robust energy innovation ecosystems that are responsive to region-specific energy innovation needs across the country, but DOE's efforts in this space are limited in scope and funding. In addition, no national organization of these entities yet exists; if developed, such an organization could help coordinate their efforts and consolidate lessons learned to extend their effect.

DOE should also update accelerators focused on energy challenges for low-income communities, such as the Clean Energy for Low-Income Communities Accelerator, which demonstrated energy efficiency and distributed renewable energy solutions for low-income communities throughout the country.

Recommendation: Authorize DOE to support clean energy technology incubators and accelerators in and outside the national laboratory system, support more entrepreneurship training for national laboratory scientists, and develop a national coordinating organization for these entities. Direct DOE to expand accelerators focused on low-income energy challenges.

Support Prizes and Challenges

In recent years, DOE has sponsored prizes and challenges that reward innovators for achieving preestablished goals. These prizes and challenges, including the L Prize for LED Lighting and the Wave Energy Prize, have successfully fostered innovation.[29,30] Although there are limitations to this approach, particularly because energy innovation is often capital intensive and entails risk, it also has its merits.

In particular, prizes can help engage nontraditional innovators, bringing new perspectives to complex problems. They can also save taxpayer dollars by paying only for success and free the government from having to (imperfectly) predict which team or approach is likely to succeed.

The Center for Excellence for Collaborative Innovation, a government-wide organization that helps coordinate prizes, has assisted many agencies in establishing department-wide policies and guidance for prizes and has coordinated best practices among the agencies. Whereas other research agencies such as the Department of Health and Human Services, Environmental Protection Agency, National Science Foundation, Department of Defense, and Defense Advanced Research Projects Agency have adopted many of these policies, DOE has adopted very few, leading to uneven implementation across the department.

Recommendation: Continue authorization for energy technology prizes and challenges and require DOE to develop a department-wide set of policies and guidance for prize implementation.

Increase Flexibility for Small Business Programs

Small businesses compete for the more than $250 million in R&D and commercialization funds that DOE distributes each year through the Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) programs. These important programs provide a unique opportunity for entrepreneurs to contribute their expertise to DOE missions.

Funding for these programs is pulled directly from individual technology offices at a set level (approximately 4 percent of R&D funds), but because the funds come from each technology office's budget (also known as the Congressional control points), they must be spent proportionately on each office's mission space. In this way, funding is atomized, reducing its effect.

Other federal agencies have recently reformed their SBIR/STTR programs to spur product innovation and commercialization. DOE should do the same, lifting budgetary restrictions to increase the effectiveness of the program.

Recommendation: Congress should consider reducing or eliminating control point restrictions on SBIR/STTR funds and make permanent certain SBIR/STTR pilot authorities that are set to expire.

Section 2: Technology-Specific Recommendations

This section outlines technology-specific recommendations for DOE RDD&D in EERE and the Office of Electricity.

DOE's energy technology work in EERE and the Office of Electricity is split into four portfolios, each of which encompasses several technology topics and is managed by a deputy assistant secretary: renewable energy, energy efficiency, sustainable transportation, grid modernization.

These portfolios represent unique technological spheres. Although there is substantial overlap between how advances in one portfolio affect another, the characteristics and levels of development of the underlying technologies are distinct enough that they must be managed with different expectations and different measures of success.

This section breaks each of the four portfolios down into its component technology topics, which correspond to individual DOE technology programs (e.g., the Solar Energy Technology Office manages solar energy RDD&D). Each section begins with a general list of topics in each technology area that DOE should be authorized to support, followed by a narrative discussion of additional considerations.

Each section concludes by noting specific legislation introduced during the 116th Congress that is supportive of these authorizing principles. These already-introduced technology-specific bills could be combined to form a starting point for a comprehensive climate-oriented DOE reauthorization. If no such legislation exists, that is also noted.

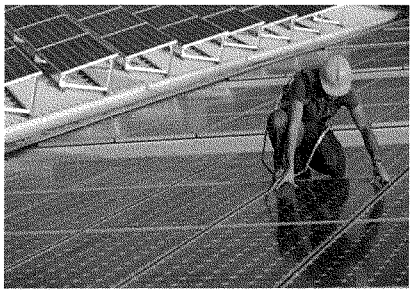
RENEWABLE ENERGY

DOE's renewable energy portfolio includes RDD&D for solar energy, wind energy, geothermal energy, and water power. Each corresponds to a DOE technology program in EERE.

Solar Energy

DOE's solar energy portfolio should include RDD&D to:

- Improve solar energy cell and module performance (including improving existing cell types and developing new cell types)
- Reduce costs for manufacturing, installation (including siting, permitting, and interconnection), financing, operations, maintenance, and customer acquisition
- Optimize solar energy systems performance and operations, including support for electric grid integration



As part of these efforts, DOE should continue research on advanced materials for solar systems, the suite of related componentry for solar systems (power electronics, sensors, communications, control), energy storage and other tools for grid integration, and building integrated solar products.

DOE should also redouble its efforts to make next-generation solar manufacturing in the United States more competitive and begin researching ways to recycle solar modules and components in anticipation of retiring the first generation of large-scale solar deployments. (Solar panels degrade over time and need to be replaced after 25 to 30 years.) DOE should pursue concentrating solar power, which holds promise for long-duration thermal storage and industrial process heating.

H.R. 3597, the Solar Energy Technology Research and Development Act of 2019, encompasses these principles.

Wind Energy

DOE's wind energy portfolio should include RDD&D to:

- Optimize wind energy system design and control to increase efficiency
- Reduce costs for manufacturing, permitting, construction, operations, recycling, and maintenance
- Develop, manufacture, and use new materials for wind energy systems components
- Optimize wind plant performance and operations, including support for electric grid integration

DOE should also increase support of wind energy demonstration and market transformation activities.

As part of these efforts, DOE should expand the mission for the wind program's main research facility, the National Wind Technology Center, to demonstrate technologies and tools to better integrate renewables and energy storage into the grid. DOE should also continue to support technological advancements that would allow for taller wind turbine towers and larger rotors to unlock the potential wind energy in the southeast and offshore.

Finally, DOE should continue efforts to reduce regulatory and market barriers, including grid integration barriers and the effect of wind power on wildlife, radars, communities, and military operations, and begin research efforts to recycle wind turbine components, especially blades (including in the design and manufacturing process).

These topics apply to onshore and offshore systems. Special emphasis should be placed on offshore wind-related research, given its relatively untapped potential in the United States.

H.R. 3609, the Wind Energy Research and Development Act of 2019, encompasses these principles.

Geothermal Energy

DOE's geothermal energy portfolio should include RDD&D to:

- Improve geothermal resource detection (hydrothermal reservoirs and fractures appropriate for enhanced geothermal system (EGS)[31] stimulation)
- Reduce costs for drilling, stimulation, and operations and maintenance
- Improve subsurface manipulation techniques, fracture control, and reservoir management for EGSs

DOE should continue technology development in conventional hydrothermal systems, low-temperature systems, and innovative value streams that extract readily available heat and power from geothermal resources. At the same time, the office should focus its efforts on technologies that will advance EGS technologies, which recent analysis indicates could support up to 60 GWe of electricity-generation capacity by 2050, enabling a 14 times increase in household geothermal heating and the installation of more than 17,500 district heating systems.[32] DOE should also investigate and improve technologies for mineral coproduction at geothermal sites.

Both of DOE's geothermal facilities—the EGS Collab site and the Frontier Observatory for Research in Geothermal Energy site—are doing important research and could be expanded. In addition, DOE should expand its geothermal deployment work to include near-field enhanced stimulation demonstrations of existing hydrothermal systems. Additional deployment work could focus on large-scale, innovative direct-use and heat pump demonstrations to illustrate efficiency, resilience, economic value, and reduction of grid dependency for American communities, academic institutions, military installations, and industrial parks.

DOE should also investigate the environmental effects of EGS technologies, including on water and air quality and seismic activity, and improve fracture control and reservoir control techniques to mitigate these effects.

No current or proposed legislation provides in-depth authorizing language for federal geothermal research. NRDC encourages the development of such language.

Water Power

DOE's water energy portfolio should include RDD&D to:

- Improve hydropower performance of closed-loop pumped storage and in-conduit hydropower
- Improve technologies and strategies to address the social and environmental challenges of hydropower
- Increase understanding of the projected changes to existing hydropower production due to climate change
- Develop marine and hydrokinetic (MHK) power technologies

Hydropower and MHK[33] technologies are at different stages of development and will require different strategies.

For hydropower, DOE should continue efforts to support pumped-storage hydropower research, along with efforts to enable hydropower to support electric grid resilience, including small hydropower paired with other renewables and energy storage. DOE should continue to research materials and advanced manufacturing methods to lower the costs and improve the performance of in-conduit hydropower.

The water power portfolio should include efforts to address the social and environmental challenges of existing hydropower. Workforce development is critical, because up to 10,000 additional workers will be needed by 2020.[34] DOE should also continue to expand research efforts to mitigate and remediate the adverse environmental and water quality effects of existing projects. Moreover, climate change is likely to alter the magnitude and seasonal patterns of hydropower production; further research and analysis from DOE is needed to help prepare the electricity sector for these changes. Any assessment of the value of hydropower or forecast of future hydropower production should take into account these climate-related changes, as well as the costs of losses to ecosystem and river functions.

Section 242 of EPAct 2005, which uses DOE water energy research funds to pay for upgrades to hydropower dams that have already been made, should be repealed or updated to limit funding to new improvements to existing hydropower projects, in conjunction with significantly stronger protections for fish, wildlife, water quality, and recreation to mitigate the ongoing adverse environmental effects of these projects.[35] It should not be used to subsidize business decisions that have already been made, in some cases nearly 15 years ago.

MHK technologies are at an earlier stage of development than hydropower. Foundational R&D into materials, controls, and cabling is necessary for all MHK types, including wave, tidal, and current (river and ocean) energy. Applications development is also needed, including further investigations of the use of MHK in maritime and desalination settings. DOE can support the next generation of entrepreneurs by developing MHK testbeds for different settings and use cases. In addition, interdepartmental partnerships are critical for MHK deployment.

H.R. 3203/S. 1821, the Marine Energy Research and Development Act of 2019, encompasses some of these principles. NRDC encourages development of language to encompass the remaining principles.

ENERGY EFFICIENCY

DOE's energy efficiency portfolio includes technology support for energy improvements to commercial and residential buildings, manufacturing, and federal energy management. Each corresponds to a DOE technology program in EERE and is discussed below.

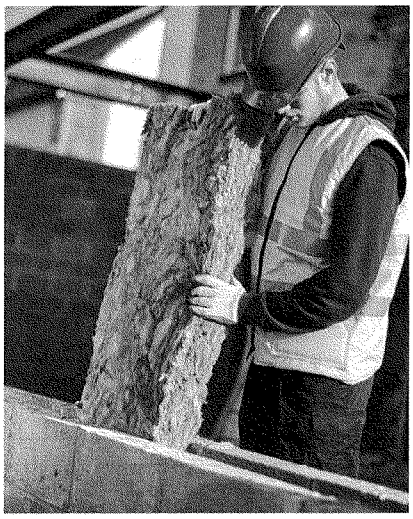
Buildings

DOE's building technology portfolio should include RDD&D to:

- Increase the energy efficiency of devices, appliances, and mechanical systems used in buildings
- Increase the energy efficiency and environmental performance of residential and commercial buildings in new construction and retrofits
- Increase the energy efficiency of buildings at a community or regional scale
- Promote electrification of building systems in a way that reduces GHG emissions and energy costs

DOE's buildings program must focus on technologies at several different scales. These include individual technologies (e.g., lighting, windows, appliances, sensors), systems (e.g., heating, ventilation, air conditioning, including heat pumps), buildings (e.g., envelope, modeling, renewables and storage integration, demand response, building materials, construction practices), and communities (e.g., building codes, grid-interactive buildings, district heating). On each of these scales, Congress should designate deep decarbonization as the primary goal for the buildings program and clarify that key strategies must include energy efficiency and electrification.[36]

The buildings program must also continue to work across the full range of technologies, from early-stage research to deployment, for residential and commercial buildings. Congress should expand DOE's ability to promote and support energy-efficient building codes by giving DOE authority to promulgate minimum, mandatory national



building codes that are responsive to energy and climate goals (e.g., net-zero emissions by 2050); require zero-carbon new buildings by a set date; and work with builders and local officials to adapt and implement building codes.

The buildings program has a mandate for R&D for building natural gas and appliance systems, which was once seen as a low-emissions alternative for building energy use. Given the growing shares of natural gas-related GHG emissions and the challenges associated with methane leaks from natural gas distribution systems, Congress should end this mission. Instead, Congress should require DOE to increase funding to research cost-effective ways to retrofit buildings for electrification and control methane leakage.

The buildings program should also take steps to implement the recommendations from the Clean Energy for Low-Income Communities Accelerator toolkit to reduce the barriers to adoption of energy efficiency in low-income households.

DOE's energy efficiency portfolio also has a weatherization program. This program distributes federal funds to states to perform low-income energy-efficient residential upgrades. This important deployment program should be reauthorized with greater funding levels.

No current or proposed legislation provides in-depth authorizing language for federal building energy research. NRDC encourages development of such language.

Manufacturing

DOE's advanced manufacturing technology portfolio should include RDD&D to:

- Increase the efficiency of energy-intensive industries
- Reduce energy waste through product lifecycles
- Increase the efficiency of and reduce manufacturing costs for a variety of key energy technology products
- Support decarbonization of U.S. manufacturing

The Advanced Manufacturing Office is critical to all of DOE's missions—energy, science, environmental management, nuclear security—because improving manufacturing processes in each of these areas can help reduce costs and speed deployment.

To support energy efficiency in the U.S. industrial sector, DOE should continue to employ its current three-part strategy of supporting R&D projects, establishing consortia, and developing technology partnerships.

DOE has supported R&D of manufacturing advanced materials that increase the efficiency of power generation, buildings, transportation, and other sectors (e.g., power electronics, electric motors, energy storage materials, advanced composites). These efforts support U.S. leadership in the emerging globally competitive marketplace for these materials and should be continued.

Because many technology options to decarbonize the U.S. industrial sector are expensive or nonexistent, DOE should establish a new effort to research, develop, demonstrate, and deploy new or existing solutions in a cost-efficient, effective manner. In collaboration with the Office of Fossil Energy, the Advanced Manufacturing Office should investigate the full range of carbon capture, utilization, and sequestration options for the industrial sector.

Finally, Congress should allow DOE's Manufacturing USA institutes to receive federal support beyond the current 5-year limit and consider a permanent program of support. Manufacturing USA institutes convene businesses, academic institutions, and other stakeholders to test applications of new technology, create new products, reduce costs and risk, and train the manufacturing workforce with the skills of the future. It is a government-wide program with approximately 15 institutes, of which DOE manages six. Permanent funding and authority could offer flexibility to institute managers and give industry members confidence in long-term support from DOE while sustaining vital programs for workforce development and engagement with small and medium-sized manufacturers that might otherwise be put at risk.

H.R. 2397, the American Manufacturing Leadership Act, supports DOE's continued use of R&D consortia. H.R. 3978/S. 2300, the Clean Industrial Technologies Act of 2019, would authorize DOE to perform R&D to decarbonize the industrial sector and create a demonstration program for technologies to cut industrial emissions. NRDC encourages Congress to build upon these bills to develop a holistic authorization for federal research in industrial energy efficiency and decarbonization.

Federal Energy Management

DOE's Federal Energy Management portfolio should include RDD&D (including training and technical assistance) to:

- Increase the energy and water efficiency of federal facilities, including building systems, buildings, and building campuses
- Increase the use of on-site renewable energy and energy storage in federal facilities
- Reduce GHG emissions and increase resilience to climate change in federal facilities
- Design, track, and report federal energy use, GHG emissions, and progress toward meeting goals

DOE's Federal Energy Management Program (FEMP) has several decades of experience assisting agencies in meeting energy, water, GHG, and other sustainability goals, including assisting agencies in leveraging third-party financing mechanisms to make these improvements. As the nation's largest energy user, the federal government must continue to make progress toward sustainability, but FEMP has never been specifically authorized.

By authorizing FEMP, Congress has a unique opportunity to speed deployment of energy-efficient, renewable power technologies; implement climate resilience strategies for the built environment; enhance adoption of advanced grid-interactive technologies; and support multidisciplinary training of America's energy workforce. As part of these efforts, Congress should authorize FEMP to work with federal agencies to pilot advanced energy and climate technologies in their facilities, providing learning experiences for the federal and commercial building sectors.

Congress should authorize FEMP to work with commercial sector building owners who lease space to the federal government to track and report building performance and identify barriers to energy and climate improvements.

Energy savings performance contracts (ESPCs), which allow federal agencies to achieve energy savings and facility improvements with no up-front capital costs or special appropriations from Congress by creating third-party financing partnerships between federal agencies and energy service companies, are an important tool for federal agencies. As it authorizes FEMP, Congress should expand federal agency use of ESPCs by clarifying that appropriated funds can augment ESPCs, allowing ESPCs for federally leased buildings and state-owned National Guard buildings, giving agencies access to low-interest ESPC financing sources including the Federal

Financing Bank, and allowing the use of ESPCs for nonenergy building components and nonbuilding mobility improvements (e.g., EVs and EV infrastructure).

S. 1857, the Federal Energy and Water Management Performance Act of 2019, encompasses some of these principles.

SUSTAINABLE TRANSPORTATION

DOE's Sustainable Transportation portfolio includes technology support for energy RDD&D for bioenergy, vehicles, and hydrogen and fuel cells. Each corresponds to a DOE technology program in EERE and is discussed below.

Bioenergy

DOE's bioenergy technology portfolio should include RDD&D to:

- Study carbon accounting for bioenergy, with consideration of land-use change and foregone carbon sequestration, and develop practical carbon accounting tools that can be used in regulations and markets
- Improve bioproducts and algae-based fuels
- Reduce the costs of technology to convert gaseous waste into usable fuels for hard-to-decarbonize segments of the transportation and industrial sectors

Because of land constraints and competing uses, genuinely low-carbon, broadly sustainable biomass is in limited supply. Most forest-derived biomass cannot reduce emissions compared with fossil fuels on timeframes that address the worst consequences of climate change. There is a pressing need for a more rigorous, granular carbon accounting methodology for bioenergy resources. Rigorous evaluation of bioenergy resources requires better frameworks for comparing land use regimes, including a characterization of the environmental, climate, health, and economic benefits of different landscapes. DOE is well-suited to develop these methodologies for adoption in regulations and markets.

The limited supply of low-carbon, sustainable biomass should be reserved for decarbonization of the highest-value end uses in hard-to-electrify segments of the economy (which does not include the power sector).

Bioproducts and algae-based fuels should be funded in accordance with their ability to reduce GHG emissions (compared with other land uses that maintain or enhance terrestrial carbon, including enhancement of forest carbon sinks) and based on the availability of sustainably produced feedstocks.

No current or proposed legislation provides in-depth authorizing language for federal bioenergy research. NRDC encourages development of such language.

Vehicles

DOE's advanced vehicle technology portfolio should include RDD&D to:

- Reduce the cost of vehicle electrification and improve the performance of EVs
- Increase internal combustion engine efficiency
- Develop weight- and drag-reduction technologies
- Support EV charging infrastructure and EV grid integration
- Reduce transportation energy use through a systems-level, multimodal focus

By most estimates, EVs will make up 5 percent to 10 percent of new light-duty vehicle sales by 2025. Although Congress should take aggressive steps to increase this number (through enactment of more-rigorous fuel economy standards and more-generous EV purchase incentives), we are likely to have combustion vehicles on the roads for many more years. DOE must continue to support combustion efficiency and electrification initiatives in all classes of vehicles as part of a GHG emissions reduction strategy. DOE should also continue to pursue emissions-reducing measures such as reducing vehicle weight and drag and increasing drivetrain efficiency.

Interactions between the grid and EVs will also become increasingly important. DOE has a role to play in developing software, hardware, and protocols to manage these interactions, along with faster, more available EV charging infrastructure.

Vehicle sharing and connectivity, along with automation and other systems-level concepts such as mode-shifting, urban design, and driver behavior, will have important effects on transportation energy use, which DOE should research and seek to optimize.

DOE should continue to support EV battery recycling efforts; address barriers to U.S. manufacturing of EV batteries; seek alternative sources of lithium; and research next-generation, beyond-lithium ion EV batteries.

Increasing the efficiency of medium- and heavy-duty vehicles will remain important, including short-haul electrification and long-haul efficiency measures. Although Congress should prohibit natural gas engine R&D for light-duty vehicles because electric vehicles are providing a cost-effective, zero-emission solution for this segment, natural gas remains an important research area for the medium- and heavy-duty vehicle segment.

S. 1085/H.R. 2170, the Vehicle Innovation Act of 2019, encompasses many of these principles, although authorized funding levels must be much higher than those in the bill to match the scale of the vehicle innovation challenge.

Hydrogen and Fuel Cells

DOE's hydrogen and fuel cells portfolio should include RDD&D to:

- Reduce the cost and increase the performance, efficiency, and durability of fuel cells, electrolyzers, and associated hydrogen technologies
- Reduce the cost and GHG emissions of hydrogen (as well as ammonia and other carbon neutral fuel) production and hydrogen systems components

Federal investment in end uses of hydrogen should be particularly expanded for transportation subsectors for which batteries are ill suited—such as medium- and heavy-duty vehicles, aviation, maritime transport, and shipping. R&D should expand to include potential applications in other sectors, such as combustion of hydrogen for process heat in the industrial sector, hydrogen for seasonal electric grid storage, and hybrid electric power with hydrogen-based fuel cells.

Congress should authorize DOE to pursue other carbon-neutral liquid fuels (e.g., ammonia, synthetic hydrocarbons) and their conversion to electricity or hydrogen.

Demonstration and deployment programs should include a hydrogen refueling infrastructure that incorporates the latest design and component innovations, as well as programs that demonstrate hydrogen uses in the industrial and power sectors.

DOE's H2@Scale concept, which explores the potential for wide-scale hydrogen production and adoption in the United States to build resiliency in the power generation and transmission sectors, frames the vision for hydrogen and fuel cell applications and identifies research gaps and pathways.

No current or proposed legislation provides in-depth authorizing language for federal hydrogen and fuel cell research. NRDC encourages development of such language.

GRID MODERNIZATION

DOE's grid modernization portfolio in the Office of Electricity includes technology support for RDD&D for the transmission grid, the distribution grid, energy storage, and transformers and other advanced components. Each corresponds to a distinct effort at DOE and is discussed below.

Transmission Grid

DOE's electric transmission portfolio should include RDD&D to:

- Develop and use advanced grid modeling and testing tools to improve energy system resilience
- Develop and deploy high-fidelity, low-cost transmission grid sensors
- Remove barriers to construction of long-distance transmission corridors connecting renewable resources with load centers
- Improve power system protection devices

DOE support of improved modeling, sensing, and devices for the transmission grid is helping increase utilization factors and maintain grid reliability and resilience, even as new trends such as renewable power integration and the extreme weather associated with climate change add complexity to operating the system.

In light of these challenges, advanced computing, new software tools, and real-time data from a higher-resolution sensor network could enable much better predictive analyses for tomorrow's grid.

Lowering power-sector carbon emissions will require a transmission system that can move power from regions with the greatest renewable potential to load centers and balance renewable energy variability on a national level. DOE can promote this by easing barriers to building new transmission and by increasing the efficiency with which we use existing infrastructure.

No current or proposed legislation provides in-depth authorizing language for federal transmission grid research. NRDC encourages development of such language.

Distribution Grid

DOE's electric distribution portfolio should include RDD&D to:

- Improve software applications and develop best practices to optimize grid distribution systems and improve planning
- Support microgrid development
- Develop software and protocols for real-time dynamic locational pricing on the grid (transactive energy concepts)
- Develop and deploy high-fidelity, low-cost distribution grid sensors
- Improve power system protection devices

Once launched, DOE's open-source grid platform (Grid Apps-D) can accelerate development and deployment of software applications to improve the planning and functionality of the distribution grid. DOE should complete this platform and fund development of software tools that can operate on the platform.

In particular, the Grid Apps-D platform could help utilities optimize operation of and investments in the distribution grid, particularly as homes and businesses install distributed renewable energy and energy storage, further electrify, and connect more EVs.

Better pricing signals for consumers (alerting consumers when electricity prices are high or low so they can adjust their usage), enabled by transactive energy software and protocols, can help improve the reliability of the grid and reduce its carbon footprint.

No current or proposed legislation provides in-depth authorizing language for federal distribution grid research. NRDC encourages development of such language.

Energy Storage

DOE's electric energy storage portfolio should include RDD&D to:

- Improve the performance and reduce the cost of grid-scale energy storage systems (including long-duration systems)
- Increase industry acceptance of energy storage devices
- Support regulators as they establish protocols for energy storage deployment
- Increase safety and support standards development (including valuation frameworks) for storage technologies

Storing electricity for use at a later time improves grid efficiency and creates new grid capabilities, including the ability to reduce GHG emissions by displacing the need for fossil-based power. Given the importance of storage to a wide variety of energy applications, many offices in DOE are supporting its development (e.g., Water Office leads on pumped storage hydro, Vehicles Technology Office leads on battery applications for EVs, Office of Electricity leads on grid-scale electrical energy storage concepts). DOE should reestablish a crosscutting initiative and team on electrical energy storage RDD&D that brings together basic and applied research offices.

Energy storage makes it easier and more cost effective to integrate renewables into the grid by allowing for variations in energy demand over the course of a day or, potentially, between seasons. Improving energy storage is critically important to combatting climate change.

S. 1602, the Better Energy Storage Technology Act of 2019, and S. 1593, the Promoting Grid Storage Act of 2019, encompass many of these principles.

Transformers and Advanced Components

DOE's transformer and advanced components portfolio should include RDD&D to:

- Support more-flexible, more-resilient large power transformers
- Improve other grid hardware (e.g., power flow controllers, cables and conductors, protection devices and switchgear) to improve grid control and management

No current or proposed legislation provides in-depth authorizing language for federal transformer and advanced grid components research. NRDC encourages development of such language.

Conclusion

The challenges associated with climate change are urgent, immense, and frightening. To overcome them, every individual and institution on the planet must respond accordingly. As Americans, we already know the steps we must take, starting with rapidly deploying the tools we already have while developing a robust set of new policies and technologies to reduce GHG emissions.

Congress can encourage the growth and deployment of innovative new technologies by updating the responsibility and authority of DOE to respond comprehensively to climate change.

If we fail to implement an updated innovation plan at DOE, we will miss the opportunity to channel federal investment into the most crucial—and most promising—technology solutions. We lose the chance to direct public funds and DOE expertise toward crucial climate challenges of equity and workforce development. We move forward with a DOE that is limited in its application of demonstration and deployment programs. In short, we gamble with our future, hoping that DOE's programs will somehow come together to address problems they were not designed to address and to develop technologies that do not fit into existing frameworks.

If Congress instead updates DOE's authorization and doubles funding for federal energy innovation, it lays the groundwork for comprehensive climate policy while supporting home-grown entrepreneurs and businesses and puts the United States in a position to lead the world in reducing GHG emissions.

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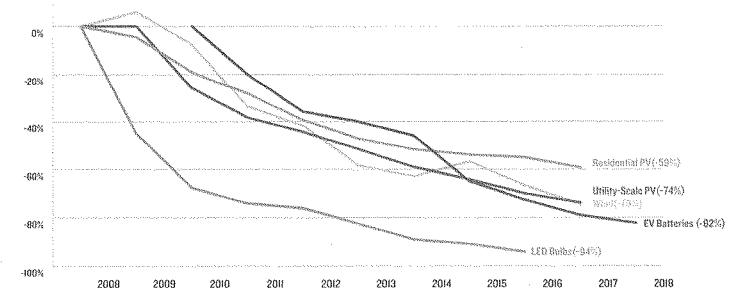
ISSUE BRIEF

THE DEPARTMENT OF ENERGY'S CLEAN ENERGY INVESTMENTS ARE CATALYZING INNOVATION NATIONWIDE

The U.S. Department of Energy (DOE) allocated more than $860 million in 2018 to support energy efficiency, renewable energy, and clean transportation research and development (R&D) through grants to 600-plus small businesses, industrial partners, and academic institutions across almost every state.[1] Funding from the DOE helps drive down the costs of clean energy innovation, from solar and wind power to electric vehicles, making these technologies more affordable while accelerating market adoption (see Figure 1).[2] These investments also spur job growth in emerging industries and help reduce harmful pollutants. The DOE enables the nation's top innovators to help the country achieve a cleaner, safer, and lower-cost energy system. Last year, in a show of bipartisan support, Congress increased funding to record levels for the DOE's clean energy innovation programs.[3] This Issue Brief showcases examples of last year's R&D funding across major clean energy categories to reinforce why policymakers should continue supporting American clean energy advancements by increasing the DOE's innovation budgets.

FIGURE 1: COST REDUCTIONS[4] IN MAJOR CLEAN ENERGY TECHNOLOGIES



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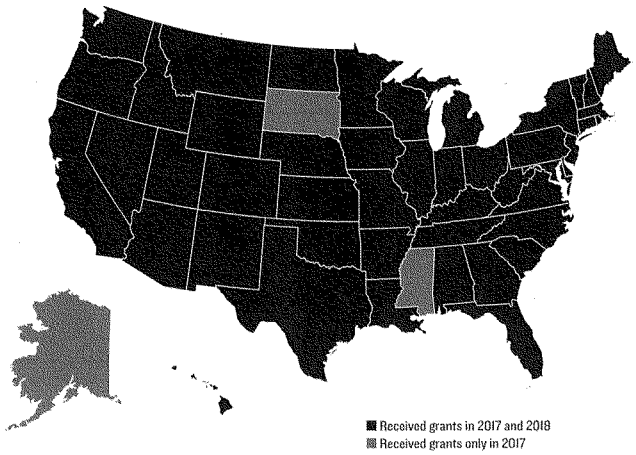
All of America stands to benefit from maintaining and growing the DOE's innovation budget. Figure 2 shows just how widespread federal clean energy investments have been across the country.[5] Researchers in all 50 states and the District of Columbia received funding from the Office of Energy Efficiency and Renewable Energy (EERE) and the Advanced Research Project Agency–Energy (ARPA-E) in 2017 and 2018. Innovation supported by EERE has contributed to making energy more affordable, creating jobs, and cleaning up the air we breathe, while ARPA-E has funded early-stage, high-impact projects that have the potential to radically improve the way we obtain and use energy altogether. U.S. Secretary of Energy Rick Perry acknowledges that "innovation works," and it is essential that this crucial DOE funding continue to reach U.S. innovators, and that the DOE be given the resources it needs to continue supporting U.S. clean energy breakthroughs.[6]

Despite unusual delays in getting money out the door, the DOE still supported several exciting and important clean energy research projects in 2018, as explored in detail in the following sections.[7] This Issue Brief is intended to help policymakers identify the groundbreaking federally sponsored clean energy R&D being done in communities across the country, and to emphasize the impact and need for a strong, federal clean energy R&D budget. Following are selected innovation funding projects from clean energy market sectors across the country. For a full list of the awards, see NRDC's dataset.[8]

FIGURE 2: EERE + ARPA-E GRANTS



SOLAR ENERGY TECHNOLOGIES OFFICE AWARDS $145.2 MILLION IN 2018

Support Includes $27.7 Million for Photovoltaic Innovation

The cost of utility-scale solar generation declined by 74 percent from 2008 to 2017. This allowed large solar systems to become more prevalent, producing enough electricity to power 11 million homes and providing 350,000 jobs across the solar industry by 2016.[9] This progress was spurred by continuous investment from the Solar Energy Technologies Office (SETO), which set ambitious goals for cost reductions and then provided funding to solar manufacturers and installers, small businesses, national labs, and universities.[10]

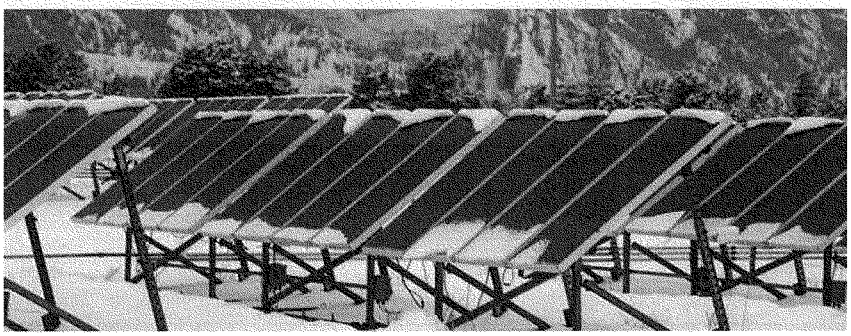
In 2018, the Solar Office committed $27.7 million, requiring an additional $8.9 million in supplementary funds from other sources, for photovoltaic (PV) research and development. This money will fund efforts to improve the affordability, reliability, and manufacturability of solar photovoltaic systems. The vast majority of solar cells that are deployed on rooftops and for utility-scale systems use silicon photovoltaic cells, and a portion of this funding will go toward further reducing their cost. But seven of the 31 funded projects will explore perovskites, a new class of solar cell materials whose efficiencies have improved dramatically in recent years and have the potential to be much cheaper than silicon-based solar cells. However, perovskites are currently limited by their poor stability, compared with traditional silicon solar cells.

SELECTED FUNDING HIGHLIGHT:

kWh Analytics, San Francisco, California

SETO's 2018 PV Innovation Roadmap reported that the single biggest need for improving solar reliability is a better understanding of the degradation rate, or the decrease in efficiency, of solar cells over their lifetimes.[11] The potential impact of degradation uncertainty was valued at $17 per megawatt hour by the National Renewable Energy Laboratory. This value is even greater than the initial cost of a solar power plant. To attract widespread investment, it is crucial to reduce this uncertainty.

San Francisco–based kWh Analytics, which provides solar risk-management software and services, received a $1.25 million grant from SETO to utilize real-world data and machine learning to quantify the degradation rate and to increase the affordability and reliability of photovoltaics.[12] kWh Analytics is well positioned to address this challenge since it has data on 20 percent of total American solar assets, which will help inform the machine learning model. The company hopes to enable the solar industry to accurately price quality by putting a dollar value on reliability, and to help buyers understand how to value their solar power assets before and after purchase. Ultimately, kWh Analytics aims to make its machine learning model available to the public.

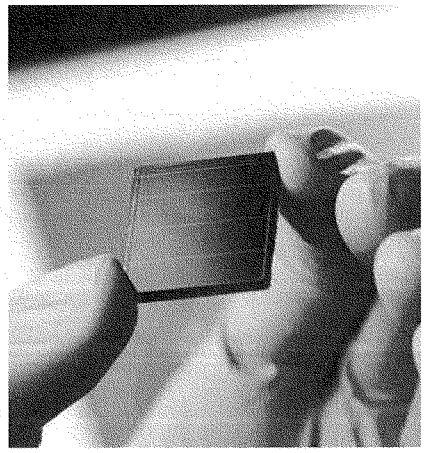


SELECTED FUNDING HIGHLIGHT:

University of Washington, Seattle, Washington

The University of Washington received a $1.5 million grant from SETO, with a requirement to source an additional $375,000 in supplementary funds, to focus on how the composition, structure, and environmental exposure of perovskites can affect their stability and performance.[13] Led by Professor of Chemical Engineering Hugh Hillhouse, the project will use machine learning methods to extract new information from vast data sets, which could reveal the fundamental connections between nanoscopic and microscopic material features and macroscopic solar cell performance and stability.

With improved stability, perovskite solar cells can leverage the many advantages they have over traditional silicon solar cells.[14] They use inexpensive raw materials, can be made flexible, and have undergone dramatic improvements in efficiency in recent years. Eventually, perovskites could allow solar cells to be used in many new applications for a fraction of the cost.



SOLAR OFFICE PROVIDES $12.7 MILLION FOR WORKFORCE TRAINING

The Solar Office also provides federal support to expand and develop the solar workforce. Job training programs at the DOE have helped develop standardized curricula for solar installers and rapidly expanded the number of people working in the solar industry. The energy workforce has a larger fraction of military veterans than the national average, but it is far less diverse than the U.S. workforce as a whole. According to *The 2018 U.S. Energy & Employment Report*, only 31 percent of the solar workforce consists of women, compared with the national workforce average of 47 percent, and only 7.2 percent is African American, compared with a 12 percent national average.[15] The Solar Office has a role to play to train and increase the representation of underrepresented groups in the solar industry. Seven projects that address workforce diversity and development received support from SETO in 2018, combining $12.7 million from DOE with an additional $2.4 million in partially matching funds from other sources.

SELECTED FUNDING HIGHLIGHT:

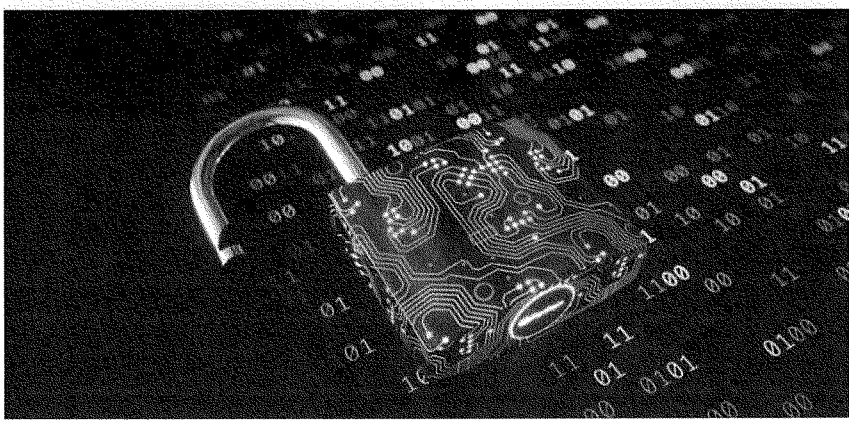
Electric Power Research Institute, Knoxville, Tennessee

The Electric Power Research Institute (EPRI) will use $6 million from SETO, plus $1.5 million in partially matching funds, to train the future solar workforce.[16] This award is the largest of 53 DOE workforce development grants and will be used to develop the data science proficiencies and analytical skills needed to manage the future grid.

EPRI will collaborate with electric utilities and universities to launch the Grid-Ready Energy Analytics Training (GREAT) with Data initiative to address workforce skills in four key technical areas: (1) data science, including descriptive, prescriptive, and predictive analytics as well as machine learning; (2) cybersecurity; (3) information and communication technologies, with an emphasis on interoperability and standardization technologies; and (4) integration of solar photovoltaic and other distributed energy resources such as energy storage, electric vehicles, and demand response.[17]

The program will develop certifications, credentials, qualifications, and standards for the training and education needed in the electric utility industry workplace. The GREAT team will also develop five strategic regional training hubs across the United States to prioritize and guide custom content development, feedback, and training to support regional workforce needs. The five-year initiative will build on the existing GridEd program, which the institute has run for the past five years for the DOE, to train and recruit power system workers and develop university curricula for new engineers and computer scientists.

Utilities with representatives on the project development team include American Electric Power (Ohio), Austin Energy (Texas), Bonneville Power Administration (Oregon), Con Edison (New York), Duke Energy (North Carolina), Entergy (Louisiana), FirstEnergy (Ohio), Lincoln Electric System (Nebraska), Portland General Electric (Oregon), Riverside Public Utilities (California), Salt River Project (Arizona), Snohomish Public Utility District (Washington), Southern California Edison, Southern Company (Georgia), and Tennessee Valley Authority. Collaborating universities include: Stony Brook University (New York), University of California at Riverside, Virginia Tech, and Washington State University.



SETO Awards $12.4 Million for Thermal Storage Research

By using thermal storage, concentrated solar power (CSP) systems allow solar energy to overcome grid integration challenges caused by solar variability. SETO aims to push CSP technology down the same cost curve as silicon solar cells, enabling the technology to drastically scale up from the 1.8 gigawatts connected to the grid today.[18] The 15 innovative research projects funded in this field received $12.4 million in DOE funding, supplementing the requirement for a cost-share of $3.1 million, to advance the development of better reflectors, high-temperature insulators, and thermal storage solutions.

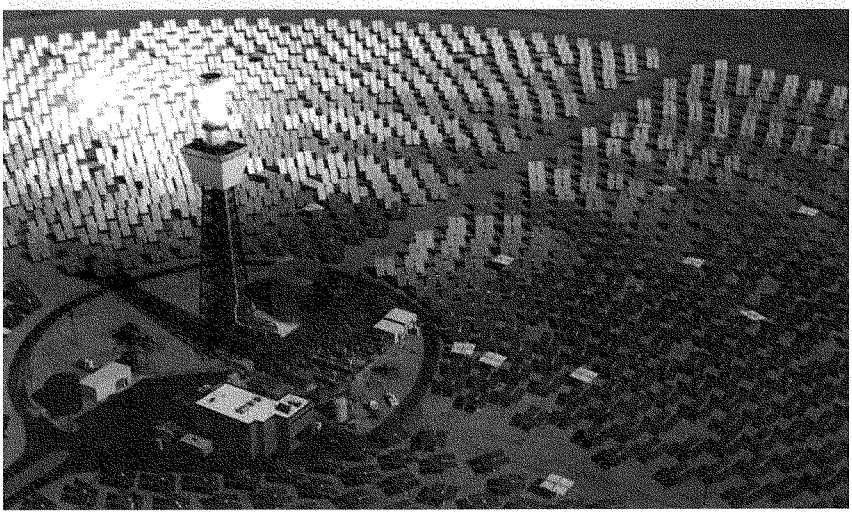
SELECTED FUNDING HIGHLIGHT:

CompRex, LLC, Madison, Wisconsin

CompRex, LLC, a Wisconsin-based small business, which specializes in compact heat exchanger and reactor solutions, received a $1.2 million award from SETO to advance CSP research and development.[19]

The two-year project will be conducted in collaboration with the University of Wisconsin–Madison and the Special Metals Corporation. Using advanced alloys and CompRex's proprietary compact design, the project aims to develop highly efficient and cost-effective heat exchangers for high-temperature and high-pressure applications such as CSP. If successful, this project can fulfill the unmet need for critical system components that can withstand high stresses due to thermal loads in CSP systems.

The chief executive officer of CompRex, Dr. Zhijun Jia, says "removal of the current performance and cost bottlenecks in these key components is not only critical to accelerating commercialization of CSP systems but also beneficial for various applications across the power industry."



WIND ENERGY TECHNOLOGIES OFFICE AWARDS $21.1 MILLION IN 2018

The average price of wind energy has dropped by 75 percent since 2008, resulting in the growth of national wind capacity from 25 gigawatts (GW) to more than 89 GW in 2017—enough to power more than 25 million U.S. homes. In 2018, the DOE's Wind Energy Technologies Office (WETO) awarded $18.5 million to fund an offshore wind research consortium and more than $2.6 million in grants to six small businesses. The Wind Office also announced a $6 million grant to identify and mitigate the wildlife impacts of onshore and offshore wind turbines, and an $8.5 million grant to develop lightweight, higher-efficiency wind turbine technologies.

SELECTED FUNDING HIGHLIGHT:

New York State Energy Research and Development Authority, Albany, New York

WETO announced in June 2018 that it would fund a national offshore wind research and development consortium to be administered by the New York State Energy Research and Development Authority (NYSERDA). Its grant, plus matching funds from NYSERDA, amount to $41 million in R&D support for innovation and research in offshore wind.[20]

This consortium brings together nine leading project developers including Deepwater Wind—which developed the first offshore wind project in the United States—and the National Renewable Energy Laboratory to accelerate the development of American offshore wind.[21] In January 2019, the consortium added the states of Virginia, Maryland, and Massachusetts; offshore wind developers EnBW North America and Vineyard Wind; and large-scale clean energy transmission developer Anbaric Development Partners. Research topics and resource challenges were identified in collaboration with the U.S. Department of the Interior. Funding will aim to catalyze technological advancements in everything from supply chain technology to wind resource and site characterization.

Breakthroughs in floating turbine technology, for instance, could allow the United States to reach capacity factors above 60 percent in deep waters, currently off-limits to fixed-bottom turbines.[22] This is much higher than the capacity factors reached by conventional onshore wind turbines, which tend to be around 40 percent. Capacity factors, typically expressed as percentages, refer to the actual energy produced over a period of time compared to the expected energy production if continuously operating at peak power. Floating wind turbines have access to more consistent and higher-speed wind, giving them the potential to be much more cost competitive than land-based systems. With 2,000 GW of offshore wind technical potential in federal waters, it is exciting to see the DOE working with industry and others to drive this domestic resource forward—making it more affordable, creating jobs, and reducing emissions.[23]

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In 2018, the Wind Office also awarded more than $2.6 million in six grants to small businesses through its Small Business Innovation Research program. Awardees included Resono Pressure Systems of Laramie, Wyoming, which received $150,000 to explore wind turbine blade aerodynamics.[24] This work will be led by Jonathan Naughton, a professor of mechanical engineering and director of the Wind Energy Research Center at the University of Wyoming. It could lead to improved energy capture from wind turbines, increasing their efficiency and further reducing the cost of electricity from wind.

VEHICLE TECHNOLOGIES OFFICE AWARDS $118.3 MILLION IN 2018

More than a million electric vehicles (EVs) were on the road in the United States at the end of 2018, and R&D efforts are underway to further improve the technology and expand deployment of these emissions-free vehicles.[25] A 2017 NRDC report, *America's Clean Energy Frontier*, examined pathways to reach 80 percent decarbonization and found that the most cost-effective pathway requires, in addition to a substantial scale-up of efficiency and renewable generation, that roughly 60 percent of light-duty vehicle miles traveled be driven by electric vehicles by 2050.[26] To cut emissions from America's largest source of carbon pollution—transportation—we need to accelerate the adoption of EVs.

Federal research has brought down the costs of EV lithium-ion batteries by 79 percent since 2010. However, the price of cobalt, crucial to lithium-ion batteries because it improves stability as the battery is charged and discharged, is rising due to increased demand and supply shortages. Without cobalt, batteries might not last more than a few cycles.

Solving that challenge through federal R&D is one focus of DOE's Vehicle Technologies Office (VTO), which in September 2018 announced $80 million in awards for advanced vehicle technologies research. These funds will support 42 recipients in 20 states, including universities, national laboratories, and corporations like Nexceris in Lewis Center, Ohio. Multiple federal agencies recognize the importance of vehicle technology innovation and have contributed to this collaborative fund, including around $7 million from the Bioenergy Technologies Office and the U.S. Army Tank Automotive Research, Development, and Engineering Center (TARDEC). This set of awards aims to address five areas of focus: batteries and electrification, materials for vehicle light-weighting and high-temperature environments, technology integration, engines and fuels, and off-road and fluid power systems.

Vehicle Office Provides $17 Million for Low-Cobalt Batteries

The United States imported more than 12,000 metric tons of cobalt in 2017. TARDEC and the DOE recognize the strategic importance of reducing our dependence on this element. Together they have dedicated $17 million to develop low-cobalt cathodes for next-generation lithium-ion batteries.[27] This will be essential in order to sustainably scale up electric vehicles There are seven award recipients within this category, including three that aim not only to reduce cobalt use in cathodes but also to develop cobalt-free batteries. They are:

- Nexceris in Lewis Center, Ohio ($2.5 million)
- Oak Ridge National Laboratory, Knoxville, Tennessee ($2.1 million)
- University of California, San Diego, La Jolla, California ($2.5 million)

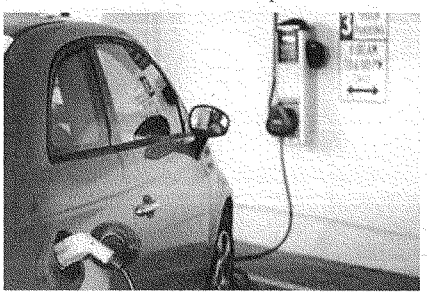
Funds for all seven projects require at least a 20 percent cost share from the grant recipients, ensuring that additional resources are dedicated to developing low-cobalt cathodes.

SELECTED FUNDING HIGHLIGHT:

Nexceris, Lewis Center, Ohio

In September 2018, the DOE and the U.S. Army announced $80 million in research funding for vehicle efficiency and electrification. Although cobalt is a critical part of today's electric vehicle batteries, helping to retain battery life and manage heat, it is expensive and often mined in unsafe conditions. Given these challenges and the huge growth of the EV market, researchers and the auto industry are racing to find alternatives to cobalt.

One awardee, Nexceris, received $2.5 million to develop cobalt-free components for lithium-ion batteries in partnership with Navitas Advanced Solutions Group and researchers at Ohio State University.[28] Nexceris is an Ohio-based provider of products and services for fuel cells and energy storage, and Navitas designs and manufactures energy storage products and systems for private- and public-sector customers.[29] This project will require cathode materials to be developed from scratch, and subsequently tested in lithium ion batteries. The goal of the project is to develop cobalt-free batteries that demonstrate higher capacities, or duration of storage, which will allow EVs to drive farther per charge without relying on risky supply chains.



This is the second recent DOE award for Nexceris, following ARPA-E's announcement in March 2018 that Nexceris won a $2.1 million award to develop a highly efficient fuel cell for power generation.[30]

VTO Awards $6.2 Million for Charging Infrastructure

A key component of transforming the transportation sector is developing sufficient charging infrastructure to reduce range anxiety, the concern drivers have that their vehicle battery will run out before they can get to their destination or to a charger. Although the DOE has been supporting research in this field for years, this latest batch of grants includes a focus on cybersecurity of charging infrastructure, with a total of $6.2 million awarded.

States and manufacturers are accelerating the deployment of electric vehicles, driven by policies such as California's executive order that sets a goal of 5 million zero-emission vehicles by 2030 and dedicates $2.5 billion for infrastructure, and it is imperative that the infrastructure built nationwide in the coming years be robust and secure from future risks.[31] Vulnerable charging infrastructure could allow drivers' personal information to be stolen, cause vehicles to be damaged, and even allow the electric grid to be attacked.[32] According to the Alliance to Save Energy's *50 x 50: Reinventing U.S. Mobility* report, the DOE and other federal agencies should assess critical infrastructure needs, develop model building codes for EV-ready parking infrastructure, and establish incentives to support charging station access, particularly for innovative, high-power charging applications.[33]

These research sites received funding to advance the protection of electric vehicles, charging stations, and the grid from cyberattacks:

- ABB Inc., Raleigh, North Carolina ($1.7 million)
- Electric Power Research Institute, Knoxville, Tennessee ($2 million)
- Virginia Polytechnic Institute and State University, Blacksburg, Virginia ($2.5 million)

In addition to the DOE's support for technologies that will accelerate electric vehicle deployment, the Vehicle Office has partnered with the Bioenergy Office to fund the development of co-optimized engines and fuels for light-duty vehicles and bio-derived blend stocks for diesel engines for medium- and heavy-duty vehicles. The $10.2 million awarded in this field supports the work of six grant recipients to improve fuel economy and reduce carbon emissions in internal combustion engines, including:

- Hyundai-Kia America Technical Center, Superior Township, Michigan ($2.2 million), which is developing a mixed-mode co-optimized engine
- Stony Brook University, Stony Brook, New York ($1.5 million), which is working on an optimized biofuel-diesel blend

While vehicle efficiencies must continue to improve, challenges in decarbonizing the broader transportation sector will also require electrification and decarbonized fuels. The Vehicle Office can lead the development of decarbonized rail, freight, aviation, and maritime technologies.

BUILDING TECHNOLOGIES OFFICE AWARDS $47.7 MILLION IN 2018

Building Office Provides $42 Million for Lighting Innovation and Building Efficiency

Buildings account for 41 percent of U.S. energy consumption and almost 40 percent of U.S. carbon emissions.[34] The DOE's Building Technologies Office (BTO) aims to reduce building energy consumption and emissions by supporting research and development, market stimulation, and building codes and standards. It has contributed to improvements in building insulation, HVAC systems, and lighting.

In the lighting sector, we have seen remarkable improvements over the past decade, thanks to light-emitting diodes (LEDs). The cost of LEDs has dropped by 94 percent since 2008, and the number of installed LEDs has increased from less than 400,000 to more than 400 million as of 2016.[35] In 2018, the Building Office continued to support innovation in building efficiency and lighting with more than $42 million in funding.[36]

In a continuation of its annual solid-state lighting (SSL) R&D funding, the BTO announced the recipients of 2018 SSL awards in January 2019.[37] Eleven projects received $11.3 million from BTO and more than $15 million in total with public-private partnerships included. Several topic areas were represented, with six of the awards and $7.7 million in public-private funding going to projects focused on organic light-emitting diodes (OLEDs), which may allow for cheaper, brighter, and possibly even foldable lighting technology.

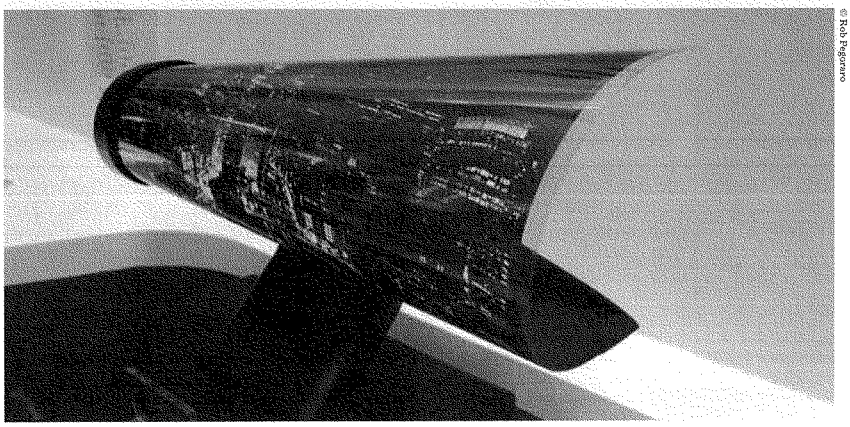
SELECTED FUNDING HIGHLIGHT:

ElectronInks, Austin, Texas

ElectronInks is a Texas-based small business that received a $150,000 BTO Small Business Innovation Research (SBIR) grant.[38] ElectronInks aims to develop flexible OLEDs by using microfluidic printing of metal microgrids at low temperature. If OLEDs can be made reliably at lower cost, this energy-efficient technology could someday enable wafer-thin televisions, light sources that can be embedded in fabrics, and new ambient-lighting applications that have been inaccessible.

The main innovation of the proposed technology is enabling micro-scale grids with small widths and large thicknesses to be printed rapidly and reliably at low temperatures. These grids are embedded into substrates that allow for subsequent organic layer deposition. The researchers at ElectronInks will collaborate with OLEDWorks, a developer and manufacturer of OLEDs based out of Rochester, New York, on integrating, testing, and characterizing the microgrids with state-of-the-art OLEDs.

This is the third SBIR grant that ElectronInks has received in the past four years, bringing its total SBIR support to more than $1 million.[39]



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Moving forward, BTO can consider several promising initiatives, including heat pump technologies that perform at higher efficiencies even at very low temperatures, and use refrigerants with low global-warming potential. NRDC's *America's Clean Energy Frontier* report found that cost-effective deep decarbonization will require us to electrify 75 percent to 100 percent of space and water heating in the residential and commercial sectors by 2050.[40] Advanced, grid-integrated heat pumps can dramatically increase building efficiency and provide valuable grid services, such as reducing peak electricity consumption and helping to integrate more renewable energy onto the grid.

ADVANCED MANUFACTURING OFFICE AWARDS $77.1 MILLION IN 2018

Manufacturing accounts for about 28 percent of U.S. energy consumption and is a significant contributor to carbon emissions.[41] The Advanced Manufacturing Office (AMO) aims to catalyze research, development, and adoption of advanced energy-related manufacturing technologies to enhance U.S. competitiveness and productivity. In FY18, AMO had a budget of $305 million to spend toward these goals, and much of this money was distributed across the DOE's national laboratories and research institutes.

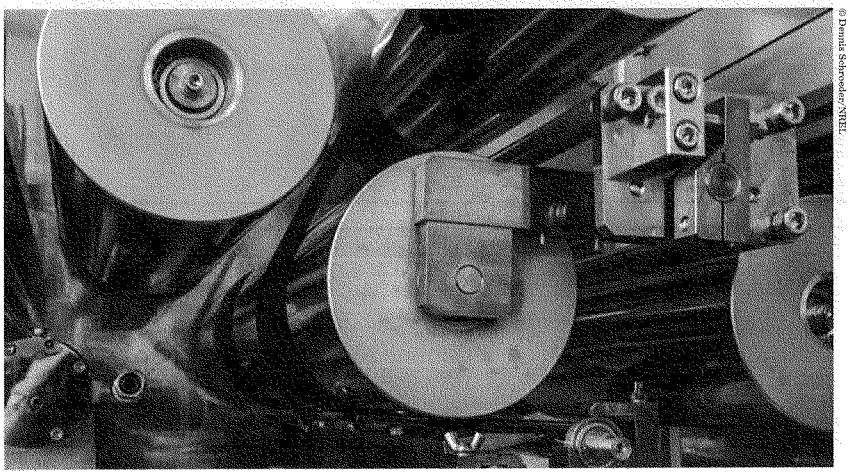
In January 2018, AMO provided $35 million to 24 early-stage recipients to research a wide variety of innovative technologies. The projects selected address topics including advanced materials for clean energy and for operating in harsh conditions, advanced manufacturing processing utilizing hydrogen and low-cost waste heat, and modeling tools to improve manufacturing efficiency. These potential breakthrough technologies can improve the competitiveness of the U.S. manufacturing industry by improving efficiencies and reducing costs, all while mitigating carbon emissions.

SELECTED FUNDING HIGHLIGHT:

Saint-Gobain Ceramics and Plastics, Malvern, Pennsylvania

Saint-Gobain Ceramics and Plastics manufactures and distributes building and high-performance materials for several sectors. In 2018 it received an AMO award for more than $820,000 to develop an advanced roll-to-roll manufacturing technique for devices including solar cells, batteries, and fuel cells.[42] The company's unique approach is to use a simultaneous multilayer coating that can potentially cut costs and energy consumption by reducing the number of process steps.

To assess the potential impact of this manufacturing technique, Saint-Gobain is partnering with Oak Ridge National Laboratory. If costs decrease, these manufacturing techniques may lead to more rapid deployment of electric vehicles and solar cells and enable new technologies, such as solar control windows that can adjust how much light enters your home.



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In September 2018, AMO awarded a total of $10 million to seven recipients for research on combined heat and power (CHP), or cogeneration. This grant is meant to enable small to midsize manufacturers to use CHP systems to provide services to the electric grid. One awardee, GE Global Research in Niskayuna, New York, will develop a grid-interface converter system and control solutions to interconnect small to midsize CHP engines to the low- to medium-voltage utility grid. The controller would allow the CHP operator to better interface with the grid operator.

ADVANCED RESEARCH PROJECTS AGENCY–ENERGY AWARDS $259.3 MILLION IN 2018

The Advanced Research Projects Agency–Energy (ARPA-E) aims to support high-potential, early-stage technologies that may have great impact—for instance, in substantially reducing emissions and improving affordability. Unlike those receiving funding from the technology-specific offices, ARPA-E grant recipients often are developing entirely new ways to generate, store, and use energy. In 2018, ARPA-E continued to support these transformational technologies through several funding programs.

ARPA-E Provides $28 Million for Energy Storage

In September 2018, ARPA-E awarded a total of more than $28 million to 10 projects as a part of its Duration Addition to Electricity Storage (DAYS) program. These grant recipients are all developing energy storage systems that provide power to the electric grid for durations of 10 hours to approximately 100 hours, opening significant new opportunities to increase grid resilience and performance. The extended discharge times of DAYS projects will enable a new set of grid applications including long-lasting backup power and greater integration of domestic renewable energy resources.

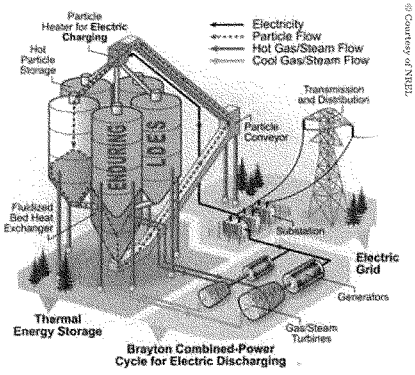
SELECTED FUNDING HIGHLIGHT:

National Renewable Energy Laboratory, Golden, Colorado

As a part of the DAYS program, the National Renewable Energy Laboratory (NREL) received a $2.8 million grant from ARPA-E to pursue long-duration energy storage.[43] NREL's unique approach includes a high-temperature charging device, low-cost thermal energy storage modules, a high-performance heat exchanger, and a closed-loop Brayton cycle turbine.

Zhiwen Ma, the lead researcher, explains that "when electric power is cheapest, electric heaters will 'charge' the storage modules by heating stable, inexpensive solid particles to more than 1,100 degrees Celsius. And when it's time to discharge this energy, the hot particles will move through a heat exchanger to heat a working fluid that drives a high-efficiency closed-loop Brayton combined cycle attached to an electric generator."

The collaborative project team includes scientists, engineers, professors, and researchers from NREL, GE Global Research, Greenway Energy, Allied Mineral Products, Inc., Purdue University, Colorado School of Mines, and Power Engineers. This diverse team aims to develop energy storage systems to provide reliable, affordable power to the electric grid while focusing on scalability.



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ARPA-E Awards $44 Million for OPEN+ Award

Through late 2018 and early 2019, ARPA-E has been gradually announcing the recipients of its 2018 OPEN+ grant, which is being distributed across topics including agriculture, energy/water, and methane. To date, $44 million has been awarded to this diverse set of high-potential projects, including a $3.5 million grant to Nanocomp Technologies in Merrimack, New Hampshire. Nanocomp is working to produce clean hydrogen from methane in a process that converts the methane into a high-value carbon solid, thus reducing the carbon emissions involved in conventional hydrogen production. Another OPEN+ award is providing the University of Oklahoma with more than $600,000 to explore methods of removing salt from contaminated water by freezing it instead of using the conventional, energy-intensive method of evaporation.

CONCLUSION

These examples represent only a small fraction of the research that the DOE is supporting with its clean energy innovation funding. We encourage policymakers to visit these innovators, learn more about their work, and ask them what more can be done to maintain U.S. clean energy leadership. The DOE's career staff have continued to leverage their nonpartisan technology expertise to enable U.S. innovators as they bring us closer to a cleaner, more affordable energy future. The bipartisan support for clean energy innovation is encouraging, and we hope this translates to increases in the DOE's innovation budget, as has been requested by members of the academic, public, and private sectors.[44]

ENDNOTES

1 This funding number does not include funds provided through lab calls, which are EERE grants competed for solely by the national labs. Hundreds of other clean energy research projects were sponsored by DOE's Office of Electricity (grid modernization and storage), Office of Fossil Energy (carbon capture and sequestration), Office of Nuclear Energy (nuclear power), and Office of Science (fundamental energy sciences). These are not included in the scope of this report, which focuses on the primary clean energy offices of EERE and ARPA-E.

2 Natural Resources Defense Council (hereinafter NRDC), "Revolution Now: The Future Is Here for Clean Energy Technology," https://www.nrdc.org/revolution-now (accessed January 20, 2019).

3 Elizabeth Noll, "Congress Agrees to Strong Funding for Clean Energy," NRDC, September 18, 2018, https://www.nrdc.org/experts/elizabeth-noll/congress-agrees-strong-funding-clean-energy.

4 Cost reductions are relative to 2008 except for EV batteries, which are compared with 2010.

5 States in dark blue received awards either in 2018, or in early 2019 for funding opportunities that were announced in 2018. Based on publicly available information on competitive grants, states in light blue received funding in 2017 but did not receive funding in 2018.

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