Energy Research Snapshot:
DOE Funding Opportunities

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New Department of Energy Funding Opportunities

The Department of Energy (DOE) continues to announce new members of its leadership team, but Congress has made little progress in confirming key positions. Only Secretary of Energy Granholm and Deputy Secretary of Energy Turk have been confirmed and another nine nominations are awaiting congressional action. Some key positions include Dr. Geraldine Richmond for Under Secretary for Science, Dr. Asmeret Berhe for Director of the Office of Science, Jill Hruby for Under Secretary for Nuclear Security, Frank Rose for Principal Deputy Administrator for the National Nuclear Security Administration, and Shalanda Baker for the Director of the Office of Minority Economic Impact. No nominations have yet been announced for the Director of ARPA-E or to lead any of the applied energy offices.

The Biden Administration plans to release the full fiscal year (FY) 2022 budget request on May 27. While awaiting more detailed information, the "skinny" budget released in April highlighted:

- $7.4 billion for the Office of Science, an increase of $400 million or 6 percent above the FY 2021 enacted level, with targeted investments in climate change modeling, including the use of Artificial Intelligence to enhance prediction and decisions-making; new materials for clean energy technologies; and construction of user facilities at DOE national laboratories.
- $8 billion for applied energy research, development, and demonstration projects, an increase of 27 percent over the FY 2021 enacted level. The stated focus is on reducing emissions from the power, transportation, buildings, and industrial sectors with investments in new technologies such as advanced nuclear energy reactors, electric vehicles, green hydrogen, and more energy efficient air conditioning and refrigeration. The proposal would also increase investments in carbon capture, storage, and utilization, and negative emissions technologies, such as direct air capture. These investments would be consistent with the Energy Act of 2020 that passed with bipartisan support in December 2020.
- $1 billion for a new Advanced Research Projects Agency for Climate (ARPA-C) and $700 million for Advanced Research Projects Agency-Energy (ARPA-E). The skinny budget did not provide information on the scope of work for ARPA-C or how it would differ from ARPA-E.

DOE recently released $62 million in FY 2021 funding opportunities focused on quantum research for nuclear physics, a new ARPA-E program to reduce fuel waste from advanced nuclear reactors, and new prize competition for innovative LED lighting.

New Funding Opportunity Announcements

- $10 million for **Quantum Research and Innovation for Nuclear Science**: Letters of Intent due May 26
  - The goal is to draw on the expertise and capabilities of the nuclear physics community to advance areas of interest such as quantum computing and quantum sensors, and using advances in quantum information science (QIS) to expand understanding of nuclear physics.
  - This funding call will support grants for research that advances foundational and use-inspired QIS research to solve challenging problems in nuclear physics, like predicting the dynamics of many-body systems that are inaccessible to experiments; exploring quantum sensors used to discover new particles and states of nuclear matter; or understanding how radiation affects current-generation superconducting qubits. Research awards will average $500,000 a year over three years.
  - This funding call will also support workforce initiatives to fund graduate students and postdocs that are interested in the intersection of QIS and nuclear physics and are partnered with a DOE National QIS center or participating in an industry internship. Awards for graduate student support may be up to $150,000 a year over three years and for postdoctoral and intern support up to $200,000.
  - This funding call also supports workshops, conferences, seminars, or pedagogical schools that would promote technical exchanges, formation of new relationships and deepen engagement with researchers in nuclear physics, QIS and industry partners. Awards will range from $10,000 for an exchange, $25,000 for a workshop, and $50,000 for a major conference.

- $40 million for ARPA-E's **Reduce Fuel Waste From Advanced Nuclear Reactors Program**: Concepts papers due July 9
    - The new Optimizing Nuclear Waste and Advanced Reactor Disposal Systems (ONWARDS) program seeks to reduce used nuclear fuel waste and waste volume generation for a repository in three areas:
        - Improvements in fuel recycling that significantly minimizes waste volumes, improves intrinsic proliferation resistance, increases resource use, and bolsters advanced reactor commercialization;
        - Improvements in sensor and data fusion technologies that enable accurate and timely accounting of nuclear materials; and
        - Development of high-performance waste forms for all advanced reactors classes with an emphasis on those forms that span multiple reactor classes and disposal environments and are safe and stable over required timescales.
    - ARPA-E plans to make up to 15 awards averaging $3 million a year over three years.
- $12 million for the **L-Prize for Innovative LED Lighting**: Applications due November 19
    - The L-Prize targets commercial sector lighting, which accounts for 37 percent of national lighting energy use.
    - The challenge is open to, among others, students, faculty, and university researchers interested in designing better lighting systems with breakthrough energy efficiency, quality, functionality and sustainability.
    - The focus is on LED lighting products that can be manufactured with significant domestic materials while demonstration energy efficiency, data connectivity, seamless lighting control visual quality and design for recycling and remanufacturing.
    - The prize also includes innovation for diversity, equity, and inclusion in how systems are designed, produced, deployed or installed.
    - The prize has three phases. DOE will select up to 10 winners in the first Concept phase and award each winner $20,000 to move to the prototype phase.

Upcoming Funding Opportunities

- May 2021: Up to $20 million for **Cybersecurity for Energy Delivery Systems**
    - The focus will likely be on artificial intelligence techniques for critical energy delivery infrastructure security, such as machine learning using data generated by physical and cyber-systems, to provide an automatic response to cyber-attack.
- May 2021: $20 million to establish a **Cadmium Telluride Photovoltaics Accelerator Consortium**
    - The National Renewable Energy Lab will release a solicitation to build a team that will develop a technology roadmap, launch research projects, and assess the domestic supply chain.
- Summer/Fall 2021: **New ARPA-E programs**
    - Macroalgea conversion for biofuels and bioproducts
    - Carbon negative building materials
- Fall/Winter 2021: **Energy Frontier Research Centers**

Open Funding Opportunity Announcements

- $35 million for a new ARPA-E **Reducing Emissions of Methane Every Day of the Year** program: Concept papers due May 21
- $5 million for **Traineeship in High Energy Physics Instrumentation**: Applications due May 25
- $5 million for **Traineeships in Accelerator Science & Engineering**: Applications due May 27
- **Science Undergraduate Laboratory Internships**: Applications due May 27 for the Fall 2021 term
- $25 million for a **Quantum Internet to Accelerate Scientific Discovery**: Proposals due May 28; open only to DOE national laboratories
- $4.5 million for the **Electricity-Conducting Materials Manufacturing Prize**: Submissions due June 8
- $4 million for the **Geothermal Lithium Extraction Prize**: Submissions due July 2

Future Research Directions

- DOE released a new 5-year plan for its Solar Energy Technologies Offices—the first major update in more than 5 years—that describes new priorities and goals to accelerate the deployment of new solar technologies and will inform future funding opportunities.
    - The plan includes priorities for all five of its main research areas: photovoltaics (PV), concentrating solar-thermal power, systems integration, soft cost reduction, and manufacturing.
    - The plan also broadened the main goal of R&D activities being only cost reduction to also now including reliable electricity, rapid deployment, and energy beyond electricity (e.g., using solar-thermal technology to reduce carbon emissions in industrial processes).
    - The plan assumes solar technology will provide 30 percent-40 percent of electricity by 2035 to meet the Biden Administration's goal of decarbonizing the U.S. grid by 2035.

Engagement Opportunities

- **ARPA-E Energy Innovation Summit**: May 24-27, 2021, virtual event
- **DOE Basic Energy Science Advisory Committee (BESAC) Town Hall on international benchmarking**: June 1
    - DOE seeking community input on research and facility capabilities in which U.S. leadership is most threatened, new ways to leverage scarce resources; and identify incentives to retain and attract scientific talent.
- **Request for Information on Photovoltaic End-of-Life Management**: Responses due June 14
    - DOE is seeking input from academia on sustainable, cost-effective end-of-life practices for photovoltaic (PV) systems.
    - In particular, DOE is interest in barriers to PV component reuse for both PV and other applications as well as areas of PV component design could be improved to increase material recycling rates without sacrificing performance, cost, or reliability.