Funding Opportunity: DOE Releases $150 Million Solicitation for Chemical and Materials Research to Advance Clean Energy Technologies and Low-Carbon Manufacturing

Lewis-Burke Associates LLC – February 23, 2022

The Department of Energy (DOE) Office of Science released a $150 million funding opportunity for fundamental chemical and materials research to advance clean energy technologies and low-carbon manufacturing. This broad funding solicitation mirrors many of the same topics in the recent Energy Frontier Research Centers funding call but is designed to support three-year projects for single principal investigators and small teams rather than four-year, large-scale, multidisciplinary, multi-institutional centers. Pre-applications are required and are due March 16.

Foundational research in clean energy technologies includes approaches to capture, produce, convert, store, and use energy that reduce or eliminate emissions such as greenhouse gases as well as approaches to decrease emissions that have been released into the environment from energy production and use, such as direct air capture and carbon storage/sequestration. A new foundational research area is low-carbon manufacturing, which refers to manufacturing processes that minimize carbon emissions and energy consumption. All proposed research must address priority research directions from recent workshops and roundtables and/or address the goals of the three Energy Earthshots focused on hydrogen, long-duration storage, and carbon negative technologies.

Specifically, DOE is seeking proposals in seven topic areas but wants proposals to focus on a single, primary topic area:

- **Carbon-neutral hydrogen**: Proposals must address the priority research opportunities in the [Foundational Science for Carbon-Neutral Hydrogen Technologies](#) roundtable report focused on hydrogen production, storage, and use. Applications focused on hydrogen production using clean energy sources must also support the goals of the [Hydrogen Earthshot](#) to reduce the cost of clean hydrogen by 80 percent to $1 per kilogram within 10 years.
- **Solar energy**: DOE will favor proposals focused on solar-to-chemical energy conversion, including hydrogen production and nitrogen reduction, that address the priority research opportunities in the [Liquid Solar Fuels](#) roundtable report. However, if innovative and addressing scientific knowledge gaps, DOE will also support projects for solar conversion to electrical energy consistent with priority research directions in the [Basic Research Needs for Solar Energy Utilization](#) report.
- **Carbon dioxide removal**: The focus is on two specific approaches—
  - Direct capture of CO2 from dilute sources, such as ambient air and oceans and surface waters that concentrate CO2 from air. Proposals focused on direct air capture must be distinct from prior lab and research university awards.
- **Energy storage**: The focus is on electrochemical approaches and efficient electrical-chemical energy interconversions. Proposals must advance the [Long Duration Storage Shot](#) goal of reducing the cost of grid-scale energy storage by 90 percent for systems that last more than 10
hours within 10 years. Proposals focused on electronical approaches such as batteries and fuel cells must address the priority research directions in the Basic Research Needs for Next Generation Electrical Energy Storage report.

- **Nuclear energy**: The focus is on chemical and materials processes of key components, such as fuels, coolants, and materials, for future nuclear reactor concepts and must address the priority research directions in the Basic Research Needs for Future Nuclear Energy report.

- **NEW TOPIC: Transformative manufacturing**: The focus is on novel synthesis, processing, modeling, operando characterization, and validation approaches for manufacturing and must address the priority research directions in the Basic Research Needs for Transformative Manufacturing report. Proposals may also address priority research directions from three other relevant reports: Chemical Upcycling of Polymers, Basic Research Needs for Catalysis Science, and Basic Research Needs for Synthesis Science.

- **Critical minerals and materials**: The focus is on chemical and materials sciences to understand and control processes and properties associated with use of rare earth elements, platinum group elements, and other critical materials. Proposals must make clear connections between the proposed research and clean energy technologies or low-carbon manufacturing and must specify how the research will advance the objectives of one or more of the other six topic areas listed above. Proposals must be distinct from prior lab and research university awards.

DOE also encourages proposals that address one or more the following cross-cutting themes:

- **Materials synthesis**: The focus is on the science of synthesis to make new high-performance materials and is aligned with priority research directions in the Basic Research Needs for Synthesis Science report.

- **Biohybrids and bio-inspiration**: The focus is on understanding the chemistry of interfaces between biochemical and inorganic components of biohybrids for use in clean energy technologies and low-carbon manufacturing.

- **Data science tools and method development**: The focus is on data science, including artificial intelligence and machine learning, as tools to accelerate discovery and progress in chemical and materials sciences research. Specific areas of interest include the “combination of standard experimental and theoretical methods with data science approaches for discovery, analysis, and modeling of chemical mechanisms and material systems with exceptional properties and dynamic behavior.”

DOE also strongly encourages teams that are led by or include Minority Serving Institutions and underrepresented groups in STEM. DOE strongly encourage applications led by Minority Serving Institutions (MSI), which include Historically Black Colleges and Universities, that are underrepresented in the Office of Science Basic Energy Sciences (BES) portfolio. DOE also encourages small group teams to include the participation of MSIs underrepresented in the BES portfolio as well as researchers from groups historically underrepresented in STEM.

**Due Dates**: Pre-applications are required and are due March 16. Full applications are due May 17. DOE plans to make award decisions in July 2022 and award announcements in September 2022.

**Eligibility and Proposal Limitations**: Proposals may be submitted by U.S. academic institutions, non-profits, industry, and national laboratories. There are no cost share requirements. Each applicant institution is limited to no more than three applications. DOE will consider the last received submissions
as the institution’s intended submissions. Pre-applications must have an institutional endorsement. Individuals are limited to be a lead Principal Investigator (PI) on one pre-application or application. The PI on a pre-application or application may be listed as a senior or key personnel on other submissions without limitation.

**Total Funding and Award Size:** DOE plans to make available $150 million over three years, or $50 million a year starting in fiscal year 2022. Award sizes will vary: $200,000 to $350,000 a year over three years for single-PI projects and $500,000 to $1.5 million a year over three years for multi-PI, small group projects.