U.S. DEPARTMENT OF ENERGY | Fossil Energy and Carbon Management

## Notice of Intent No.: DE-FOA-0003153

DISCLAIMER: The "Notice of Intent to Issue" is for informational purposes only; the Department of Energy is not seeking comments on the information in this notice and applications are not being accepted at this time. Any information contained in this notice is subject to change.

## This is a Notice of Intent to Issue:

## Funding Opportunity Announcement No.: DE-FOA-0003105

## Critical Material Innovation, Efficiency, and Alternatives Funding Opportunity Announcement

The Office of Fossil Energy and Carbon Management (FECM) intends to issue a Funding Opportunity Announcement (FOA) entitled "Critical Material Innovation, Efficiency, and Alternatives Funding Opportunity Announcement."

In this planned funding opportunity, FECM intends to help build off of prior DOE (e.g., from Office of Science, Advanced Research Projects Agency–Energy (ARPA-E), Energy Efficiency and Renewable Energy (EERE), and FECM) and private industry investments across the critical materials supply chain, from extraction, processing, refining, manufacturing, and recycling, as well as on investments in developing alternative materials or manufactured products with less supply vulnerability. FECM anticipates funding high impact applied research, development, and demonstration (RD&D) bench and pilot scale projects. This funding opportunity is looking to develop bench scale concepts in the Technology Readiness Level (TRL) 2 to 4 range and to demonstrate processes on a continuous/semicontinuous bench scale before scaling up to pilot scale, at TRL 6. FECM supports rebuilding the U.S. leadership role in the economically viable, environmentally responsible extraction, separation, processing, refining, and recycling of critical minerals and materials (CMM). This supports the generation of sustainable, globally competitive U.S. domestic supply chains for onshore production of CMMs for commercial commodities, clean energy, and national defense industries. FECM also supports the Administration's goals for zero-emission vehicles to comprise half of passenger car and light truck sales by 2030 of decarbonizing the electricity sector by 2035 and the economy by 2050. This program supports the goals of Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, which established the Justice40 Initiative. Justice40 seeks to ensure that 40% of the overall benefits of certain federal investments flow to disadvantaged communities. Given that R&D projects on critical minerals could involve reuse and clean-up of former mining and oil

field and other wastes we are particularly interested in the potential co-benefits to disadvantaged communities.

This Notice of Intent (NOI) describes a preliminary plan that will evolve during the FOA development process.

**Background**

On November 15, 2021, President Joseph R. Biden, Jr. signed the Infrastructure Investment and Jobs Act (IIJA, Public Law 117-58), also known as the Bipartisan Infrastructure Law (BIL). [1] The BIL is a once-in-a-generation investment in modernizing and upgrading American infrastructure to enhance U.S. competitiveness, drive the creation of good-paying jobs, tackle the climate crisis, and ensure strong access to economic, environmental, and other benefits for disadvantaged communities.[2] The BIL appropriates more than $62 billion to the U.S. Department of Energy (DOE)[3] to invest in American manufacturing and workers; expand access to energy efficiency and clean energy; deliver reliable, clean, and affordable power to more Americans; and demonstrate and deploy the technologies of tomorrow through clean energy demonstrations.

The FOA will build on prior DOE, other government agency, and private sector investment, and implements section 7002(g) of the Energy Act of 2020 and BIL section 41003(c)[4] through the program's research and development activities by the creation of innovative methods and technologies for the efficient and sustainable provision of critical materials to the domestic economy and the expected activities under the program to mitigate the environmental and health impacts of the extraction, processing, manufacturing, use, recovery, and recycling of critical materials. Also, section 41003 (c) of the BIL and section 7002 (g) of the Energy Act of

[1] Infrastructure Investment and Jobs Act, Public Law 117-58 (November 15, 2021). https://www.congress.gov/bill/117th-congress/house-bill/3684. This FOA uses the more common name Bipartisan Infrastructure Law.

[2] Pursuant to E.O. 14008, "Tackling the Climate Crisis at Home and Abroad," January 27, 2021, and the Office of Management and Budget's Interim Justice40 Implementation Guidance M-21-28 and M-23-09, DOE recognizes disadvantaged communities as defined and identified by the White House Council on Environmental Quality's Climate and Economic Justice Screening Tool (CEJST), located at https://screeningtool.geoplatform.gov/. DOE's Justice40 Implementation Guidance is located at https://www.energy.gov/sites/default/files/2022-07/Final%20DOE%20Justice40%20General%20Guidance%20072522.pdf.

[3] U.S. Department of Energy. November 2021. "DOE Fact Sheet: The Bipartisan Infrastructure Deal Will Deliver for American Workers, Families and Usher in the Clean Energy Future." https://www.energy.gov/articles/doe-fact-sheet-bipartisan-infrastructure-deal-will-deliver-american-workers-families-and-0

[4] BIL section 41003(c) authorizes appropriations for section 7002(g) of the Energy Act of 2020 (30 U.S.C. 1606(g)).

2020 directs the establishment of a program of research, development, demonstration, and commercialization. This includes a broad range of RD&D for:

(A) alternative materials;
(B) alternative energy technologies or alternative designs of existing energy technologies;
(C) technologies or process improvements that minimize the use and content, or lead to more efficient use, of critical materials;
(D) innovative technologies and practices to diversify commercially viable and sustainable domestic sources of critical materials, including technologies for recovery from waste streams;
(E) technologies, process improvements, or design optimizations that facilitate the recycling of critical materials, and options for improving the rates of collection of products and scrap containing critical materials from post-consumer, industrial, or other waste streams;
(F) advanced critical material extraction, production, separation, alloying, or processing technologies that decrease the energy consumption, environmental impact, and costs of those activities, including—
(i) efficient water and wastewater management strategies;
(ii) technologies and management strategies to control the environmental impacts of radionuclides in ore tailings;
(iii) technologies for separation and processing; and
(iv) technologies for increasing the recovery rates of coproducts and byproducts from host metal ores.

This program will also support the broader government-wide approach to upgrading and modernizing infrastructure, including by strengthening critical domestic manufacturing and associated supply chains to maximize the benefits of the clean energy transition as the nation works to curb the climate crisis, empower workers, and advance environmental justice. The program is focused on:

- Creating and retaining good-paying jobs, where workers are properly classified as employees, free from discrimination and harassment, with a free and fair choice to join, form, or assist a union.
- Supporting inclusive and supportive workforce development efforts to strengthen America's competitive advantage based on innovation, efficiency, and a skilled and diverse workforce up and down the supply chain.
- Rebuilding the U.S. leadership role in economically viable, environmentally benign extraction, separation, and processing technologies that support the generation of sustainable U.S. domestic supply chains for onshore production of CMM for commercial commodities, clean energy, and national defense industries.
- Enhancing national security by reducing the reliance of the United States on foreign competitors for critical materials and technologies.

DE-FOA-0003105 is anticipated to be issued in the last quarter of Fiscal year 2023. If issued, DE-FOA-0003105 is envisioned to have an initial closing approximately 90 days after issuance. Potential applicants are encouraged to begin forming teams. It is envisioned that some or all of the Areas of Interest in the FOA will be reissued in multiple tranches over the next few years.

Please note this is a preliminary FOA implementation plan and will likely evolve during the FOA development process. Guidance on specific application and reporting requirements will be included in the FOA, if issued.

DOE will not accept questions at this time regarding issuance of the FOA. Details on how to submit questions and comments will be provided in the FOA, if issued.

**Technical Overview and Objectives**

Critical minerals and materials (CMM)[5] are necessary for most clean energy technologies, defense applications, and most modern technologies. Currently, more than 80% of our nation's supply of critical minerals comes from foreign sources. The United States currently imports more than half its consumption of 43 of the 50 critical minerals[6] and metals, with no domestic production for at least 14 of these critical minerals.[7] Additionally, in many cases, foreign supply chains have poor environmental or human rights standards. Developing a strong domestic supply of critical minerals may reduce U.S. dependence on other countries, create high-wage American manufacturing jobs, support communities across the country that have long depended on mining and energy production, and build responsible critical material supply chains. Similarly, as evidenced by multiple Executive Orders,[8,9] the recent BIL that was enacted on November 15, 2021, [10] DOE's first-ever strategy on securing America's energy supply chains, [11] and the Inflation Reduction Act,[12] transitioning the production of these CMM and their associated supply chains back to the United States is a strategic priority. This FOA is designed to generate RD&D that will support the building of robust, responsible, domestic critical mineral and material supply chains for clean energy technologies and to address national security

[5] https://www.energy.gov/cmm/what-are-critical-materials-and-critical-minerals

[6] U.S. Department of the Interior, U.S. Geological Survey, 2022 Final List of Critical Minerals, 87 Fed. Reg. 10381 (Feb. 24, 2022).

[7] U.S. Geological Survey, Department of the Interior, Mineral Commodity Summaries 2022 (January 31, 2022). https://pubs.usgs.gov/periodicals/mcs2022/mcs2022.pdf

[8] Executive Order 13817, A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals (December 20, 2017). *See also* U.S. Department of the Interior, Final List of Critical Minerals 2018, 83 Fed. Reg 23295 (May 18, 2018).

[9] Executive Order 14017, America's Supply Chain (February 24, 2021).

[10] BIL, *supra* note 1.

[11] https://www.energy.gov/policy/securing-americas-clean-energy-supply-chain

[12] Inflation Reduction Act, Public Law 117-169 (August 16, 2022). https://www.congress.gov/bill/117th-congress/house-bill/5376/

needs.

This effort is NOT focused on rebuilding the mineral supply chains of decades ago, but rather is designed to catalyze a U.S. leadership role in economically viable, environmentally benign extraction, separation, processing, refining, and recycling of CMM technologies. This supports the generation of sustainable, globally competitive U.S. domestic supply chains for onshore production of CMMs for commercial commodities, clean energy, and national defense industries, and are in support of the Administration's goals to achieve 100 percent carbon pollution -free electricity by 2030, carbon pollution-free electricity sector by 2035 and net-zero emissions economy-wide by no later than 2050. Priority will be placed on materials from the USGS Critical Minerals List[13] and the DOE Critical Materials Assessment[14], or the development of alternative materials or designs that use less CMM and support more robust supply chains. DOE intends that the RD&D performed in this FOA will reduce resource use (e.g., energy, water, chemicals), negative environmental impacts (e.g., $CO_2$, air, and water emissions), and costs, compared to currently used technologies. The FOA will require projects to track and report on results related to environmental impacts, environmental justice, community engagement and community-engaged siting, equity, and workforce development.

The overarching goal of this opportunity is to develop domestic supply chains for critical minerals and materials (CMM) by creating paths and strategies to commercialize processes that utilize domestic resources. These activities can include extraction, separation, processing, refining, alloying, or recycling technologies but should focus on decreasing environmental emissions, reducing resource usage or intensity, and/or optimizing cost.

This NOI is to inform the public of a planned upcoming FOA to address priorities in the BIL regarding the Critical Material Innovation, Efficiency, and Alternatives research program as authorized in section 7002(g) of the Energy Act of 2020 and as authorized appropriations in BIL section 41003(c).

It is anticipated that the FOA will include five areas of interest (AOI), which are separated into phases as follows:

| AOI # | Name (Phase #, if applicable): | Budget and Award |
|---|---|---|
| 1 | CMM Supply Chain: Multiphase opportunity to develop technologies or process improvements along the critical mineral and material (CMM) supply chain that develop new domestic supplies of CMMs. | |

13 U.S. Department of the Interior, U.S. Geological Survey, 2022 Final List of Critical Minerals, 87 Fed. Reg. 10381 (Feb. 24, 2022).

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| 1A | CMM Supply Chain (Phase I): RD&D to develop and demonstrate a complete representative bench scale facility on a continuous/semicontinuous basis to produce CMMs from waste streams, impoundments, and conventional ore bodies that contain CMMs. | $20M; up to 10 awards from $0.5M to $3M per award with 80/20 cost share |
| 1B | CMM Supply Chain (Phase II): Pilot scale facility development and construction. Pilot scale facility must be built off a bench scale process(es) that has been demonstrated on a continuous/semicontinuous basis. | $50M; up to 4 awards from $10M to $30M per award with 50/50 cost share |
| 2 | Value Added Products: Multiphase opportunity to develop value added products from a feedstock containing CMM. | |
| 2A | Value Added Products (Phase I): RD&D to develop and demonstrate a complete bench scale facility to produce value added products from waste streams, recycled materials, impoundments, and conventional ore bodies that contain CMM. | $10M; up to 5 awards from $0.5M to $2M per award with 80/20 cost share |
| 2B | Value Added Products (Phase II): Pilot scale facility development and construction. Pilot scale facility must be built off a bench scale process that has been demonstrated on a continuous/semicontinuous basis. | $20M; up to 2 awards from $5M to $10M per award with 50/50 cost share |
| 3 | Next Generation Technologies: Development of novel, “next generation” technologies to be utilized in the production of critical minerals and materials that focus on the optimization of environmental emissions, resource usage or intensity, and cost within extraction, production, separation, processing, refining, alloying, manufacturing, or recycling technologies. | $10M; up to 10 awards from $0.5M to $1M per award with 80/20 cost share |
| 4 | Alternative Materials: Development of CMM alternatives or substitutes to increase robustness of domestic supply chains. | |
| 4A | Alternative Materials (Phase I): Bench scale development of CMM alternatives or substitutes (excluding magnets and battery technologies) to reduce reliance on foreign supply chains. | $10M; up to 10 awards from $0.5M to $1M per award with 80/20 cost share |
| 4B | Alternative Materials (Phase II): Pilot scale development of CMM alternatives or substitutes to reduce reliance on foreign supply chains. | $10M; up to 2 awards at $10M with 50/50 cost share |
| 5 | Alternative Products: Development of alternative energy technologies or designs of existing energy technologies, particularly technologies or designs | $10M; up to 10 awards from $0.5M to $1M per award with 80/20 cost share |

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| | that use materials that are abundant in the US or not subject to supply restrictions. | |

This Notice is issued so that interested parties are aware of FECM's intention to issue this FOA in the near term. All the information contained in this Notice is subject to change. FECM will not respond to questions concerning this Notice. Once the FOA has been released, FECM will provide an avenue for potential Applicants to submit questions.

FECM plans to issue the FOA on or about September 2023 via the Grants.gov website https://www.grants.gov. When the FOA is released, applications will be accepted only through Grants.gov.

In anticipation of the FOA being released, Applicants are advised to complete the following steps, which are required for application submission:

- **Unique Entity Identifier (UEI) and System for Award Management (SAM)** - Each applicant (unless the applicant is excepted from those requirements under 2 CFR 25.110) is required to: (1) register in the SAM at https://www.sam.gov before submitting an application; (2) provide a valid UEI number in the application; and (3) maintain an active SAM registration with current information when the applicant has an active federal award or an application or plan under consideration by a federal awarding agency. DOE may not make a federal award to an applicant until the applicant has complied with all applicable UEI and SAM requirements and, if an applicant has not fully complied with the requirements by the time DOE is ready to make a federal award, DOE will determine that the applicant is not qualified to receive a federal award and use that determination as a basis for making a federal award to another applicant.

  **NOTE: Due to the high number of UEI requests and SAM registrations, entity legal business name and address validations are taking longer than expected to process. Entities should start the UEI and SAM registration process as soon as possible. If entities have technical difficulties with the UEI validation or SAM registration process, they should use the HELP feature on SAM.gov. SAM.gov will address service tickets in the order in which they are received and asks that entities not create multiple service tickets for the same request or technical issue. Additional entity validation resources can be found here: GSAFSD Tier 0 Knowledge Base - Validating your Entity.**

- Register in FedConnect at https://www.fedconnect.net/. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf

- Register in Grants.gov to receive automatic updates when Amendments to a FOA are posted. http://www.grants.gov/. All applications must be submitted through Grants.gov.

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**Applications are not being accepted at this time.**

**DOE may issue a FOA as described in the NOI; may issue a FOA that is significantly different than the FOA described in the NOI; or may not issue a FOA at all.**