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U.S. DEPARTMENT OF ENERGY
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
NEPA DETERMINATION

RECIPIENT: PUREgraphite LLC **STATE:** TN

PROJECT TITLE: High Efficiency Continuous Graphitization Furnace Technology for Lithium-Ion Battery Synthetic Graphite Material

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002322	DE-EE0009429	GFO-0009429-001	GO9429

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:

Description:

A9 Information gathering, analysis, and dissemination	Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to this subpart.)
B1.31 Installation or relocation of machinery and equipment	Installation or relocation and operation of machinery and equipment (including, but not limited to, laboratory equipment, electronic hardware, manufacturing machinery, maintenance equipment, and health and safety equipment), provided that uses of the installed or relocated items are consistent with the general missions of the receiving structure. Covered actions include modifications to an existing building, within or contiguous to a previously disturbed or developed area, that are necessary for equipment installation and relocation. Such modifications would not appreciably increase the footprint or height of the existing building or have the potential to cause significant changes to the type and magnitude of environmental impacts.
B5.1 Actions to conserve energy or water	(a) Actions to conserve energy or water, demonstrate potential energy or water conservation, and promote energy efficiency that would not have the potential to cause significant changes in the indoor or outdoor concentrations of potentially harmful substances. These actions may involve financial and technical assistance to individuals (such as builders, owners, consultants, manufacturers, and designers), organizations (such as utilities), and governments (such as state, local, and tribal). Covered actions include, but are not limited to weatherization (such as insulation and replacing windows and doors); programmed lowering of thermostat settings; placement of timers on hot water heaters; installation or replacement of energy efficient lighting, low-flow plumbing fixtures (such as faucets, toilets, and showerheads), heating, ventilation, and air conditioning systems, and appliances; installation of drip-irrigation systems; improvements in generator efficiency and appliance efficiency ratings; efficiency improvements for vehicles and transportation (such as fleet changeout); power storage (such as flywheels and batteries, generally less than 10 megawatt equivalent); transportation management systems (such as traffic signal control systems, car navigation, speed cameras, and automatic plate number recognition); development of energy-efficient manufacturing, industrial, or building practices; and small-scale energy efficiency and conservation research and development and small-scale pilot projects. Covered actions include building renovations or new structures, provided that they occur in a previously disturbed or developed area. Covered actions could involve commercial, residential, agricultural, academic, institutional, or industrial sectors. Covered actions do not include rulemakings, standard-settings, or proposed DOE legislation, except for those actions listed in B5.1(b) of this appendix. (b) Covered actions include rulemakings that establish energy conservation standards for consumer products and industrial equipment, provided that the actions would not: (1) have the potential to cause a significant change in manufacturing infrastructure (such as construction of new manufacturing plants with considerable associated ground disturbance); (2) involve significant unresolved conflicts concerning alternative uses of available resources (such as rare or limited raw materials); (3) have the potential to result in a significant increase in the disposal of materials posing significant risks to human health and the environment (such as RCRA hazardous wastes); or (4) have the potential to cause a significant increase in energy consumption in a state or region.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to PUREgraphite LLC to develop, fabricate, and test a novel induction-based graphitization furnace. The furnace would be designed for use by the lithium-ion battery sector, as graphite is an essential input material for battery production. For the project, two pilot furnaces would be fabricated and used for operational testing. The pilot furnaces would build on previously developed models and be used to demonstrate commercial viability (Generations 3.1 and 3.2). The project would be completed over two Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP. This NEPA Determination is applicable to

both BPs.

Proposed project activities would consist of conceptual design work, computer modeling, material characterization (e.g., graphite powders, precursor materials), equipment fabrication, equipment installation/commissioning, operational testing, lithium-ion battery assembly and testing, and process optimization. Equipment for the project would consist of the Generations 3.1 and 3.2 pilot furnaces, milling equipment, heating and cooling systems, and auxiliary equipment (e.g., piping, electronics, controls). Equipment would be custom made for the project by third-party manufacturers in coordination with PUREgraphite. All equipment would be installed and commissioned at PUREgraphite's manufacturing facility in Chattanooga, TN. Equipment fabrication and installation will be discussed at length below. Once installed, the equipment would be used to produce graphite powders to test the operational capabilities of the pilot furnaces. Operational testing would consist of feeding the furnaces with input materials (e.g., precursor petroleum coke) to generate graphitized material. Input materials would be produced via a milling process. Approximately 500 metric tons of precursor petroleum coke would be used as input material over the lifetime of the project. Processing parameters (e.g., operating temperatures, feed rates, material throughput, etc.) and equipment configurations would be adjusted at various points in the project, based on data generated through operations. Powders produced by the project would be used to fabricate lithium-ion batteries, in order to demonstrate the commercial viability of the process.

PUREgraphite would coordinate all project activities and perform conceptual design work, graphitization testing, and equipment/process optimization. All equipment required for graphitization testing would be installed and operated at PUREgraphite's manufacturing facility in Chattanooga, TN. In total, two furnaces would be developed, installed, and operated at this location (discussed below). Project partner Novonix would perform material characterization (i.e., battery testing) at its laboratory facilities in Nova Scotia, Canada.

All equipment would be produced to specification by third-party manufacturers, with oversight by PUREgraphite. Harper International Corporation would fabricate the furnace systems at its manufacturing facility in Buffalo, NY. Neuman & Esser Group would fabricate milling systems at its manufacturing facility in Übach-Palenberg, Germany. Flexicon Corporation would fabricate a bulk powder handling system at its manufacturing facility in Bethlehem, PA.

Equipment installation at PUREgraphite's facility in Chattanooga, TN would require facility modifications, both indoors and outdoors. The two furnaces and milling equipment would be installed indoors and connected to various pieces of auxiliary equipment. These would include a 550 L liquid argon tank and two (2) chillers. The argon tank and chillers would be installed on new concrete pads outdoors, adjacent to the facility. The concrete pads would be built on a paved area within the confines of PUREgraphite's facility. The concrete pads would have a total area of approximately 2,250 square feet. An additional concrete pad measuring 920 square feet may be built for a third chiller, if it is determined later in the project that this is needed. Water piping would be installed to connect the chillers to equipment indoors. New gas piping would also be established between the argon tank outdoors and the furnace equipment indoors. For the milling equipment, modifications to the existing duct/exhaust systems would be performed. A discharge duct would be installed in the building wall. Finally, electrical capacity would be augmented to in the facility to power the additional equipment. This would entail the establishment of additional electrical wiring and conduits. All modifications to facility electric connections would be performed by PUREgraphite's electrical utility provider.

PUREgraphite's facility is located within 1 mile of an historic house listed with the National Register of Historic Places (NRHP). Several other listed properties are also within 3 miles of the facility. PUREgraphite's facility is a commercial facility, originally constructed in 1988, currently used for manufacturing purposes. Outdoor installation work would be limited to the laying of concrete foundations and equipment installation on a previously paved area within the boundaries of PUREgraphite's facility. These installations would not be observable at ground level from any of the NRHP listed properties. Considering this, DOE has determined, in accordance with 36 CFR 800.4(d)(1), that there would be no historic properties affected from project activities being funded by DOE. Concurrence to DOE's determination was provided by the Tennessee Historical Commission on May 13, 2021.

Project work would include the use and handling of fine carbon powders, pressurized gases, and the operation of high temperature furnaces and powered machinery. All such handling would be performed in controlled laboratory and manufacturing environments that routinely work with these materials/equipment as part of their regular course of business. Potential hazards would be mitigated through adherence to established institutional health and safety policies and procedures. All personnel would be trained in institutional operations and safety requirements and would use appropriate personal protective equipment. Operation of the furnaces at PUREgraphite's facility would emit potentially harmful gases. All gas emissions would be managed through an exhaust gas system to filter and scrub potentially harmful materials. Waste materials would be disposed of by a qualified waste management service provider. PUREgraphite and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Advanced Manufacturing Office
This NEPA determination does not require a tailored NEPA Provision.
NEPA review completed by Jonathan Hartman, 05/13/2021

FOR CATEGORICAL EXCLUSION DETERMINATIONS

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.

The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

DOE has determined that work to be carried out outside of the United States, its territories and possessions is exempt from further review pursuant to Section 5.1.1 of the DOE Final Guidelines for Implementation of Executive Order 12114; “Environmental Effects Abroad of Major Federal Actions.”

The proposed action is categorically excluded from further NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Casey Strickland Date: 5/17/2021

NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

- [x] Field Office Manager review not required
- [ ] Field Office Manager review required

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: _____

Field Office Manager