

**FINDING OF NO SIGNIFICANT IMPACT**  
**FOR**  
**THE PLASMA LOW-COST ULTRA SUSTAINABLE**  
**CATHODE ACTIVE MATERIAL (PLUSCAM™) PROJECT**

**6K ENERGY TENNESSEE, LLC**

**JACKSON, MADISON COUNTY,**  
**TENNESSEE**

**DOE/EA-2223**

**LEAD AGENCY:** U.S. Department of Energy

**ACTION:** Finding of No Significant Impact

**SUMMARY:**

Pursuant to the Council on Environmental Quality (CEQ) Regulations (40 *Code of Federal Regulations* [CFR] Parts 1500-1508) for implementing the procedural provisions of the National Environmental Policy Act (NEPA) (42 *United States Code* [U.S.C.] 4321 *et seq.*) and Department of Energy (DOE) NEPA implementing regulations (10 CFR 1021), the DOE completed the Final Environmental Assessment (EA) (DOE/EA-2223) to analyze the potential environmental, cultural, and socioeconomic impacts of partially funding the 6K Energy Tennessee, LLC (6K) Plasma Low-cost Ultra Sustainable Cathode Active Material (PlusCAM™) Project (the project), located in Jackson, Madison County, Tennessee.

The objective of the project would be to demonstrate the ability to domestically produce multiple battery chemistries using 6K's patented UniMelt® microwave plasma processing technology. The EA identifies, documents, and evaluates the potential environmental effects of implementing the proposed project. All discussions and findings related to the Proposed Action and the No-Action Alternative are presented in the attached EA and Appendices. The EA is hereby incorporated by reference.

Based on the analysis in the EA, DOE determined that implementing the project would not constitute a major federal action that would significantly affect the quality of the physical, biological, or human environment, within the meaning of NEPA. DOE further determined that there would be beneficial impacts to socioeconomics, environmental justice, greenhouse gas emissions reduction, and the electric vehicle (EV) and lithium-ion battery industries from implementation of 6K's project. Therefore, the preparation of an Environmental Impact Statement is not required, and DOE is issuing this Finding of No Significant Impact (FONSI).

**BACKGROUND:**

As part of the Infrastructure Investment and Jobs Act (Bipartisan Infrastructure Law; Public Law 111-58), DOE's National Energy Technology Laboratory (NETL), on behalf of the Office of Manufacturing and Energy Supply Chains and the Office of Energy Efficiency and Renewable Energy, jointly issued the Funding Opportunity Announcement (FOA) DE-FOA-0002678 Bipartisan Infrastructure Law (BIL) Battery Materials Processing and Battery Manufacturing. The BIL appropriates more than \$62 billion to

the DOE to deliver a more equitable clean energy future to the American people and will invest more than \$7 billion in the battery supply chain over the five-year period encompassing fiscal years 2022 through 2026.

DOE considers 6K's project and location to be one that can meet the focus of the BIL sections: a) creating and retaining good-paying jobs; b) supporting inclusive and supportive workforce development efforts to strengthen America's competitive advantage; c) ensuring that the United States has a viable battery materials processing industry to supply the North American battery supply chain; d) expanding the capabilities of the United States in advanced battery manufacturing; e) enhancing national security by reducing the reliance of the United States on foreign competitors for critical materials and technologies; f) enhancing the domestic processing capacity of minerals necessary for battery materials and advanced batteries; and g) ensuring that the United States has a viable domestic manufacturing and recycling capability to support and sustain a North American battery supply chain.

If approved, DOE would provide \$50,000,000 in financial assistance in a cost-sharing arrangement with the project proponent, 6K, who would provide at least \$127,808,342.

### **PURPOSE AND NEED:**

The overall purpose and need for DOE action pursuant to the Office of Manufacturing and Energy Supply Chains in collaboration with the Office of Energy Efficiency and Renewable Energy and the funding opportunity under the BIL is to accelerate the development and production of a resilient supply chain for high-capacity batteries by increasing investments in battery materials processing and battery manufacturing projects. This and other selected projects are needed to maximize benefits of the clean energy transition as the nation works to curb the climate crisis. These projects would meet the objective of recruiting, training, and retaining a skilled workforce in communities that have lost jobs due to displacement of fossil fuel-based energy jobs. The project would also meaningfully assist in the nation's economic recovery by creating manufacturing jobs in the United States in accordance with the objectives of the BIL. The funding received from BIL will make this project (and others) possible.

### **ALTERNATIVES CONSIDERED:**

#### **PROPOSED ACTION**

DOE proposes to partially fund the construction of a new facility to produce multi-chemistry cathode materials, namely Lithium-Nickel-Manganese-Cobalt-Oxide (LiNiMnCoO<sub>2</sub>) (NMC) and Lithium Iron Phosphate (LFP), in a plant using patented 6K's UniMelt® microwave plasma processing technology. 6K's facility would expand domestic processing of battery materials to meet the incredible growth in demand for energy storage materials for portable power, grid storage, and EVs.

The current process for battery material manufacturing is co-precipitation which generates large amounts of pollutants, consumes huge amounts of water, and uses energy-intensive processes that take 2-3 days for production. By contrast, 6K has developed UniMelt® microwave plasma processing technology, which produces material in as little as 2 seconds and produces less hazardous waste, and drastically reduces water usage and power usage. The use of a microwave plasma provides for a controlled, uniform, highly reactive, and high temperature reaction zone that enables the synthesis of materials at rates far greater than with conventional methods, and with much greater chemistry and size flexibility. The multi chemistry plant would produce both NMC and LFP batteries: both dominant EV batteries in commercial markets.

The facility would be located within the Airport Industrial Park in Jackson, Madison County, Tennessee. The project site was selected due to its location in an industrial zone, its access to existing transportation

infrastructure and public utilities, and its potential to have a positive economic impact on the regional and local community. The facility would include a 125-150,000-square-foot main building, an electrical building, utility switchyard, raw material and finished product warehousing, and 206 parking spaces. The project would include both a pilot phase and full-scale production. Once full-scale and fully operational, the facility would produce enough material to supply over 100,000 electric vehicles (EV) annually. (This quantity is an approximation only and is contingent upon EV battery specifications and customer demand). The facility would generate zero hazardous waste (ammonia/sulfates) and 70% less greenhouse gases while using only 10% of the water and 30% of the energy that traditional battery material production methods use.

The 6K facility would be brought online in two (2) distinct phases: Phase 1 and Phase 2. Phase 1 would include a pilot program for production lines 1 and 2, which would have 750 tons per annum (tpa) capacity by Q3 2024 from six (6) Generation (Gen) 1 UniMelts® (with a nitrogen oxide (NOx) scrubber) producing both NMC and LFP. During Phase 1, processing would then ramp up to include production lines 3 and 4, for a combined 3,000 tpa capacity by Q1 2025 from 30 Gen 1 UniMelts® (with closed loop nitric acid production). Phase 2 would see production line 5 brought online and additions to production lines 3 and 4, including retrofitting with ten (10) Gen 2 UniMelts® with closed loop nitric acid production, for a combined capacity of 10,000 tpa by Q1 2026.

The mission of the Proposed Action is to strengthen domestic production of EV battery materials and enable those materials to be crafted with a focus on environmental responsibility with reduced water and energy usage and zero hazardous waste compared to traditional material manufacturing processes utilizing 6K's revolutionary sustainable manufacturing process.

#### **NO-ACTION ALTERNATIVE**

Under the No-Action Alternative, DOE would not provide cost-shared funding to 6K for the project. As a result, the project would not likely occur in the same time frame, and alternative sources of funding and investment would be sought to achieve the same substantive project scope. Without the project, there would be no change or beneficial impacts incurred from current conditions related to domestic energy production.

#### **ENVIRONMENTAL CONSEQUENCES:**

The EA examined the potential effects of the Proposed Action and No-Action alternatives on the following 14 resource areas of environmental and socioeconomic concern: aesthetics and visual resources, air quality, biological resources, cultural resources, geology and soils, greenhouse gases, health and safety, land use, noise, parks and recreation, socioeconomics and environmental justice, traffic and transportation, waste management and water resources. Parks and recreation was the one (1) resource area screened from further analysis since DOE determined that it would sustain negligible impacts from the project and therefore did not require further evaluation. The remaining resource areas were analyzed in more detail. The EA also considered cumulative impacts that might reasonably occur as a result of the Proposed Action.

Based on the analysis contained in the EA, DOE determined that the construction and operation of the 6K facility would not have significant adverse impacts, either individually or cumulatively, on the physical, biological, or human environments. Implementation of the project would result in short-term and long-term negligible to minor adverse impacts, which are described in the following paragraphs. Under the No-Action Alternative, the project would not likely occur in the same time frame, and there would be no change or beneficial impacts incurred from current conditions.

### **Aesthetics and Visual Resources**

Impacts to aesthetics and visual resources during construction of the new facility would be minor, temporary, and minimized through Best Management Practices (BMPs). Once constructed, the project would result in permanent visual changes at the site. However, direct and cumulative impacts on aesthetic and visual resources resulting from project operations would be minor, given its location in an industrial zone, its distance from existing residences, and because the facility would have an appearance consistent with other industrial complexes in the Airport Industrial Park.

### **Air Quality**

Minor adverse impacts to air quality would be incurred during construction and operation of the project. During construction, air emissions and dust would be generated from mobile sources (e.g., trucks, machinery) as well as on-site ground-disruptive operations. Construction activity would temporarily increase airborne dust particles and engine emissions. This change would be almost negligible, and would be minimized with BMPs as necessary.

The operation of the facility would result in air emissions including Hydrogen (H<sub>2</sub>), Carbon Dioxide (CO<sub>2</sub>) and very little (almost undetectable) short chain hydrocarbons, Methane, Ethane, and Carbon Monoxide. Control devices would be used including fabric filter/dust collectors on every UniMelt®, and NO<sub>x</sub> recovery to form nitric acid which would be re-consumed in the production process. Impacts on air quality during project operation would be minor, given the location of the project site, existing air quality conditions, the amount of anticipated air emissions and the permitting of such emissions, and the controls that would be implemented during operation to meet the applicable emission standards.

Cumulative emissions associated with the project are minor, and constrained by regulatory requirements, including the Clean Air Act and Tennessee State Statute. In addition, the project would foster the expansion of EV adoption, effectively counterbalancing emissions produced by gasoline- and diesel-powered vehicles' exhaust and leading to a substantial reduction in nationwide greenhouse gas emissions—a significant driver of climate change. Further, compared to traditional co-precipitation techniques, UniMelt® uses up to 2x less power with a corresponding reduction in carbon dioxide (CO<sub>2</sub>) emissions, so the facility has an environmental advantage over other facilities that are also proposing to expand domestic battery material supply. Therefore, cumulative impacts to Air Quality are not significant.

### **Biological Resources**

Minor direct, indirect, and cumulative impacts on general biological resources (wildlife and vegetation) would be incurred. The impacts are limited due to the current land use of and adjacent to the project site, the modified and monoculture nature of the project area, the avoidance of impacts to key habitat types (wetlands, streams, mature trees), and the facility's lack of connection to intact natural habitats. There is no critical habitat within the project site.

Pursuant to its responsibilities under Section 7 of the Endangered Species Act, DOE concluded that the project would have no effect on the listed threatened or endangered species or on designated critical habitat. On July 11, 2023, the DOE sought optional concurrence from the U.S. Fish and Wildlife Service (USFWS) and the Tennessee Wildlife Resources Agency (TWRA) on the “no effect” finding for the project. The TWRA concurred, and does not anticipate this project to cause adverse impacts to species of concern. No formal response from the USFWS was received.

**Cultural Resources**

As it appears that much of the project site has been previously disturbed, cultural resources are not likely to be present. Therefore, it is expected that construction would have no impact on cultural resources. On July 12, 2023, the Tennessee State Historic Preservation Office (SHPO) concurred that there are no National Register of Historic Places listed or eligible properties affected by this undertaking. On August 2, 2023, the Chickasaw Nation also reviewed the provided documentation and concurred with the DOE's finding of no adverse effect. They were unaware of any specific historic properties, including those of traditional, religious, and cultural significance, in the project area. No response from the Coushatta Tribe of Louisiana has been received to date.

In the event of an inadvertent discovery of possible cultural materials during construction, the project would implement the project-specific Inadvertent Discovery Plan (IDP).

**Geology and Soils**

The project would have minor impacts on geology and soils. The project would require land disturbance and grading; however, the land is relatively flat, and the project is designed to minimize land disturbance. No large trees or shrubs (with an extensive root system) would be cleared or grubbed from the project site. Construction design would take into account loess deposit soils which may require undercutting and replacement as well as the presence of moisture sensitive soils. During construction, the Contractor would implement sufficient BMPs to minimize erosion and the risk of sediment or construction-related contaminants from entering surface waters.

The project would directly convert up to 40 acres and indirectly convert approximately 10 acres of prime farmland to industrial use. On May 25, 2023, Form AD-1006 and supporting documentation was sent to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Tennessee for assessment of the prime farmland conversion. In a letter dated June 1, 2023, the NRCS determined that the direct and indirect conversion of up to 50 acres of prime farmland at the Airport Industrial Site is consistent with the project area having been designated by a state or local government entity for commercial and/or industrial land use and therefore is not subject to the Farmland Protection Policy Act (FPPA) and no mitigation is required.

**Greenhouse Gases**

Construction of the project would result in temporary greenhouse gas (GHG) emissions from sources including the transportation of equipment and materials, use of vehicles and construction machinery, and curing of concrete. Net emissions of embodied carbon from the construction of the project would be approximately 4,099 metric tons.

During operation (once at full capacity), and using the EPA Greenhouse Gas Equivalencies Calculator, the approximate CO<sub>2</sub> emissions from electricity use for project operations would be 37,283 metric tons (82,194,300 lbs.) of CO<sub>2</sub> per year. When operational, the approximate CO<sub>2</sub> emissions from traffic to/from the project site would be 1,034 metric tons (2,278,626 lbs.) of CO<sub>2</sub> per year.

GHG emission reductions would be realized through the manufacturing of different cathode active materials within the United States rather than importing them from another country. The cathode active materials would often be used in the domestic manufacture of lithium-ion batteries to be used in EVs. It is expected that these EVs would primarily replace conventional gasoline and diesel-fueled vehicles, resulting in a proportional reduction in GHG emissions (primarily CO<sub>2</sub>). Over the course of ten years of operation,

batteries produced using material generated at the project site would be expected to eliminate between 4,493,770 to 4,600,000 metric tons of CO<sub>2</sub> emissions (depending on the amount of product being used for EV car batteries by the customers). This emissions reduction would far exceed any emissions anticipated from construction and operations of the project. The DOE therefore determined that there would be beneficial impacts from greenhouse gas emissions reduction from implementation of the project.

### **Health and Safety**

There is negligible concern for public and environmental safety from the metals, chemical compounds, and gases stored, used, and generated at the plant. Construction and operation of the project would result in minor potential for health and safety impacts to project construction, operations, and decommissioning personnel, and 6K employees. Potential health and safety impacts to construction and operations personnel would include occupational injuries and potential occupational exposure to hazardous materials from transport, storage, and use of process chemicals including nitric acid, trimethylaluminum (TMA), nickel nitrate, cobalt nitrate, manganese nitrate, aluminum nitrate, potassium nitrate, lithium carbonate, iron phosphate, sucrose, and vanadium oxide, and other corrosive, flammable, or toxic chemicals. Safety Data Sheets (SDS) for hazardous and non-hazardous substances would be available on site. The facility would be configured for these compounds to be safely stored, segregated, and handled. Procedures are being prepared for prompt, safe remediation of spills, and for disposal of the spilled materials in compliance with pertinent RCRA requirements. Safety elements incorporated throughout the design of the project would minimize hazards. To protect workers, the public, and environment, the plant would have closed systems that utilize engineered gas and vapor capture and treatment regimens. Otherwise, system venting would be used primarily for pressure balancing. The emissions would meet applicable regulatory standards. Measures to protect against and prevent unauthorized entry to the facility would be in place.

All project-related construction and operations personnel would receive training in areas relevant to construction and operational safety and their job requirements. All personnel would use personal protective equipment appropriate for their work activities in accordance with 6K safety plan and applicable requirements. 6K would hire a plant Safety, Health and Environment Manager (SHEM) to implement the requirements of the safety program. Potential risks to health and safety would be further minimized through adherence to Occupational Safety and Health Administration (OSHA), Tennessee OSHA, the Environmental Protection Agency (EPA) and Tennessee Department of Environment and Conservation (TDEC) requirements, project-specific and 6K specific safety plans, and standard safety practices.

### **Land Use**

Impacts to land use from the Proposed Action would be minor. The project is consistent with the industrial property zonation and with surrounding land uses. The project would either directly or indirectly convert up to 50 acres of farmland to industrial use. Because agricultural land is considered previously disturbed, impacts to land use from construction of the project site would be temporary and minor. The operation of the facility would not change any of the surrounding land use nor would it add any additional residential or commercial areas. Therefore, impacts to land use from the operation of the project would be minor. The project site is not within Tennessee's designated coastal zone.

Impacts from the Proposed Action when combined with other past, present, and reasonably foreseeable future actions, would have no new or increased impacts on land use within the project boundary or surrounding area beyond what has already been experienced.

### **Noise**

Noise and sound levels during construction would be typical of new construction activities and would be intermittent and temporary. The project would generate temporary noise during construction from heavy machinery, such as bulldozers, graders, excavators, dump trucks, and cement trucks, as well as smaller tools such as jackhammers and nail guns. Once the facility is operational, noise from ongoing activities would largely be confined to the interior of the facility. There are no nearby residential properties. Noise impacts during operation would therefore be negligible. When combined with other past, present, and reasonably foreseeable future actions, the project would have negligible increased noise impacts within the project boundary and the surrounding area beyond what has already been experienced.

### **Socioeconomic and Environmental Justice**

The project is expected (not yet determined) to create 150-300 or more jobs during construction and approximately 150 to 230 long-term jobs throughout operation. Based on the increase in employment opportunities and the available labor force, the project would result in a beneficial socioeconomic impact. 6K would make efforts to work with certified disadvantaged business enterprises (DBEs) or minority-owned businesses during the construction phase. 6K also has a goal to hire forty percent minority, veteran, and disabled employees during operations. Considering the absence of disproportionately high negative environmental and human health impacts; the goal and efforts to hire at least forty percent from veteran, disabled and minority groups from the local area; the training provided; the cultivation of a positive and diverse work environment and the “6K for 6K Scholars” scholarship program offered, DOE concluded that the project would result in positive socioeconomic and environmental justice impacts.

### **Traffic and Transportation**

The increase in traffic during construction and operation of the project is expected to be minor. There are no current plans for future additions, expansion, or other activity related to or connected with this proposal which would cumulatively increase traffic further. The applicants do not own contiguous parcels. Moreover, no parking spaces would be eliminated by the project, no temporary road closures or detours would be required during either the construction or operation of the project, and there would be no impacts to public transit. The project would employ workers already local and contributing to traffic in the area. They would be accessing to/from the project site in shifts which further minimizes impacts to traffic. Therefore, while there would be an incremental increase in overall traffic, no adverse cumulative effects on the region’s overall transportation network are anticipated as a result of the project.

### **Waste Management**

The project would store Resource Conservation and Recovery Act (RCRA) wastes temporarily, but these wastes would not be treated or disposed of at the facility. All RCRA waste would be transferred to facilities permitted by the Division of Solid Waste Management (DSWM) in the TDEC or permitted by other federal or state jurisdiction. General wastewater would be directed to the sewer and the Miller Creek Wastewater Treatment Plant. Solid waste generated during the construction phase of the plant would be minimal, and would be collected, placed in appropriate receptacles, and disposed of off-site in accordance with DSWM requirements.

All non-hazardous RCRA Subtitle D solid waste generated during operations would be collected and disposed of in dumpsters awaiting collection by vendor or municipal refuse transport. Incidental to operation of the facility, RCRA Subtitle C characteristic hazardous wastes (i.e., not listed wastes) may be generated. The facility would acquire necessary RCRA Subtitle C permit from the DSWM. It is

expected that the facility would be either a very small quantity generator or a small quantity generator. Hazardous wastes would be transferred to duly-permitted treatment, storage, and disposal facilities.

### **Water Resources**

No impacts to water resources are expected. The project would not directly or indirectly impact the off-property wetlands or streams surrounding the project site. There are no mapped floodplains present within the project site.

No impacts to streams are expected as they lie outside the construction footprint. For the construction phase, a Stormwater Pollution Prevention Plan (SWPPP) would be prepared and implementation of appropriate BMPs would prevent potential impacts to the streams from turbid stormwater runoff. Once constructed, discharge of treated water would be directed off site. No surface water diversion or withdrawal is proposed. No riparian vegetation would be removed.

One delineated wetland occurs outside the construction footprint and off the subject property. No permitting through the USACE or TDEC was required because there are no direct or indirect wetland impacts proposed. BMPs would be implemented during construction to protect these resources from turbid stormwater runoff impacts.

No surface water or groundwater withdrawals or discharges associated with the project or other surrounding identified projects are proposed, nor would construction impact groundwater, as the groundwater tables are not shallow in the project site. Therefore, no impacts to groundwater are expected. The water supply to the site is provided by the utility (Jackson Energy Authority), which has sufficient available capacity. While the cumulative projects in the area would lead to an incremental increase in water use, it would remain below the utility's available and approved capacity.

### **PUBLIC AVAILABILITY:**

DOE encourages public participation in the NEPA process. The Draft EA was released for public review and comment. The public was invited to provide oral, written, or e-mail comments on the Draft EA to DOE during the comment period, which occurred from October 29, 2023, to November 28, 2023. Copies of the Draft EA were distributed to cognizant Federal and State agencies and Tribal Nations (on 10/25/2023 through 10/27/2023), the local Jackson-Madison County Library (433 E Lafayette St, Jackson) and a notice was published three times in the Jackson Sun newspaper in the State of Tennessee. The Draft EA was also made available on the NETL website at <https://netl.doe.gov/node/6939>.

A total of three (3) comments from three (3) entities were received during the comment period. A response was received from the State Historic Preservation Office stating that the project had previously been reviewed by their agency. A second response was received from the Tennessee Wildlife Resources Agency, who agreed that the project is not anticipated to have adverse impacts to resources under Agency Authority. Both comments were considered but did not require changes to the EA. A third response was received from the Environmental Protection Agency about community engagement and environmental justice considerations. That letter is included in the Final EA. The DOE sent a comprehensive response detailing the myriad of initiatives and outreach conducted to date. Minor changes to the Final EA in the corresponding sections of the document were made to address this comment. All changes are shown in bold text to allow readers to quickly identify altered material.

No other comments were provided by other agencies, Native American Tribes, non-governmental organizations, or the public.



The Draft and Final EA are available on the National Energy Technology Laboratory (NETL) website at <https://www.netl.doe.gov/library/environmental-assessments> and DOE's NEPA website at <https://netl.doe.gov/node/6939>.

**MITIGATION REQUIREMENTS:**

No additional mitigation measures beyond those contained in permits obtained or to be obtained by 6K, Inc. from the appropriate permitting authorities is required.

**FOR FURTHER INFORMATION ON THE DOE NEPA PROCESS CONTACT:**

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**DETERMINATION:**

Based on the information presented in the Final EA (DOE/EA-2223), DOE finds that providing cost-shared funding to 6K for the proposed PlusCAM™ project would not constitute a major federal action that would significantly affect the quality of the physical, biological, or human environment, within the meaning of NEPA. Therefore, the preparation of an Environmental Impact Statement is not required, and DOE is issuing this FONSI.

Copies of the Final EA and this FONSI are available at DOE's NETL EA website at <https://netl.doe.gov/node/6939>. The EA and FONSI are also available at DOE's NEPA – EA website at <https://www.energy.gov/nepa/doe-environmental-assessments>.

Issued in Pittsburgh, Pennsylvania on this 12 day of Jan, 2024.

**SEAN PLASYNSKI**

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