

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



RECIPIENT: Calcify LLC, dba Carbon Capture Machine (CCM)

STATE: CT

PROJECT TITLE: Production of amorphous calcium carbonate from captured cement kiln flue gas co2 for use as supplementary cementitious material in a low-emissions blended cement

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002804	DE-EE0010852	GFO-0010852-001	GO10852

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.)

B3.6 Small-scale research and development, laboratory operations, and pilot projects

Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

B3.15 Small-scale indoor research and development projects using nanoscale materials

Siting, construction, modification, operation, and decommissioning of facilities for indoor small-scale research and development projects and small-scale pilot projects using nanoscale materials in accordance with applicable requirements (such as engineering, worker safety, procedural, and administrative regulations) necessary to ensure the containment of any hazardous materials. Construction and modification activities would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible).

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Calcify LLC, who, for the purposes of this project, is doing business as Carbon Capture Machine (CCM) to capture carbon dioxide from cement kiln flue gases to produce amorphous calcium carbonate (ACC) for use in blended cement.

Project activities would include laboratory-scale research and development, front-end engineering design (FEED), building and commissioning a pilot unit to capture 1-3 metric tons (MT) carbon dioxide/day, and optimizing process conditions. Stakeholder engagement and feedback integration would also be included as part of the project.

The formulation and optimization of ACC, the evaluation and characterization of brine feedstock, the research and development of various alkali production sources including the use of ACC using a continuous carbon capture and mineralization process with simulated kiln flue gases, and the project design, to include FEED for the pilot unit integration, would all occur at the CCM office in Fairfield, Connecticut.

The formulation and optimization of ACC would also occur at the CCM laboratory in Kettering, Ohio. The Production of ACC using a continuous carbon capture and mineralization process with simulated cement kiln flue gas as well as preliminary feasibility testing and FEED of the pilot unit would also occur at this location.

The characterization of stabilized and nanosized ACC for inclusion as a supplemental cementitious material would occur at Lawrence Technological University in Southfield, Michigan. This site would also conduct a comprehensive assessment on the ACC production at both laboratory- and limited production-scale levels.

Equipment design, project analysis, and liquid container sensor evaluation would occur at Sacred Heart University in Fairfield, Connecticut.

Award efforts during Budget Period (BP) 1 would include research and development as well as FEED work. Budget Period 2 would focus on stakeholder engagement as well as building and commissioning the pilot unit. Budget Period 3 would involve optimizing the ACC production process and conducting techno-economic and life-cycle assessments. The pilot unit location is currently unknown and its commissioning as well as all subsequent tasks and subtasks would require further NEPA review once the location is identified. Therefore, BP2, Tasks 6 and BP3, Tasks 7 and 8 are not included in this NEPA Determination. This NEPA Determination only applies to BP1, Tasks 1 through 4 and BP2, Task 5, which includes administrative tasks, laboratory testing in existing facilities, pilot unit site selection, hiring, permitting, engineering design and stakeholder engagement.

The project would involve the storage and use of carbon dioxide emissions, dilute aqueous sodium hydroxide, dilute aqueous calcium chloride and other brines. Any potential health hazards related to handling of these materials would be assessed at each site. Adequate fire protection and ventilation systems would be utilized to convey hazardous gases outdoors. Existing corporate health and safety policies as well as employee training, the use of proper protective equipment, engineering controls, and regular monitoring would be implemented. All hazardous materials would be managed in accordance with federal, state, and local environmental regulations. Additional policies would be implemented as new risks are identified to ensure compliance and minimize health and safety risks to employees and the public.

The project would involve capturing carbon dioxide from cement kiln flue gases, whereby a portion of existing flue gas emissions would be diverted, carbon dioxide removed from the flue gas stream, and the remaining emissions circulated back to the emission exhaust system. Air emissions are expected to be negligible.

No mission/operational changes are expected at the existing four facilities as part of the proposed project. Physical modifications would occur as part of the pilot unit 1-3 MT carbon dioxide/day carbon capture and utilization system installation during BP2, which may include ground disturbance.

Any and all permits required for the execution of the project at the above-referenced locations would be the responsibility of the recipient.

DOE has considered the scale, duration, and nature of proposed activities to determine potential impacts on resources, including those of an ecological, historical, cultural, and socioeconomic nature. DOE does not anticipate impacts on these resources within the scope of this current NEPA Determination that would be considered significant or require DOE to consult with other agencies or stakeholders.

NEPA PROVISION

DOE has made a conditional NEPA determination.

The NEPA Determination applies to the following Topic Areas, Budget Periods, and/or tasks:

- BP1: Task 1 through Task 4, including all Subtasks
- BP2: Task 5, including all Subtasks

The NEPA Determination does not apply to the following Topic Area, Budget Periods, and/or tasks:

- BP2: Task 6, including all Subtasks
- BP3, Task 7 and Task 8, including all Subtasks

Include the following condition in the financial assistance agreement:

Any and all permits required for the execution of the project at the above-referenced locations would be the responsibility of the recipient and must be attained before the permit-pertinent work can commence.

The recipient is required to contact the Project Officer, identified in Block 15 of the Assistance Agreement before proceeding with the permit-pertinent efforts. The recipient must receive notification of approval from the DOE. If the recipient moves forward with activities that are not authorized for federal funding by the DOE Contracting Officer in advance of acquisition of any required permits, the recipient is doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

Notes:

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.

A portion of the proposed action is categorically excluded from further NEPA review. The NEPA Provision identifies Topic Areas, Budget Periods, tasks, and/or subtasks that are subject to additional NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:  _____ Date: 10/18/2024
NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

- 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