

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



RECIPIENT: AVAPCO LLC

STATE: GA

PROJECT TITLE : Sugar is the New Crude

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002396	DE-EE0009764	GFO-0009764-001	G09764

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.

**B5.15 Small-
scale
renewable
energy
research and
development
and pilot
projects**

Small-scale renewable energy research and development projects and small-scale pilot projects, provided that the projects are located within a previously disturbed or developed area. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to AVAPCO, LLC to produce multiple sugars from three different plant-derived feedstocks. The sugars would be evaluated to determine potential convertibility to commercially viable end products, including aviation biofuel.

DOE has not previously completed any NEPA Determinations (NDs) for this specific award, but DOE previously completed a NEPA Determination (ND) (FOA-0002396-001; A9, B3.6; 5/20/2021) for Funding Opportunity Announcement (FOA) DE-FOA-0002396. The ND for the FOA applies to initial verification activities for awards issued under the FOA, including this award (DE-EE0009764). Initial verification activities for this award would include verification of data and assumptions from the initial award application to establish baseline metrics necessary to determine relative success of subsequent award activities.

After successful completion of initial verification activities, AVAPCO would procure equipment and supplies necessary to complete award activities. Equipment would be installed indoors at AVAPCO's Thomaston Biorefinery (Thomaston, GA), which includes a preexisting pilot plant and laboratory facilities. Major equipment to be procured and installed would include a filter press (pilot plant), pilot-scale membrane separation unit (pilot plant), and size-exclusion chromatography unit (laboratory). The filter press would replace the pilot plant's existing (pulp/sample) washer which would lower the water and energy resource requirements for pilot plant operation. The pilot-scale membrane separation unit would replace the current unit which is not large enough to accommodate subsequent award activities. All equipment would be tested to verify proper operation and performance.

While procuring and installing equipment, AVAPCO would procure feedstocks. Three different feedstocks would be procured: energy cane, forest residuals (i.e. byproducts from forest harvesting), and construction debris.

Approximately 6.5 dry tons of each feedstock would be procured from stockpiles supplied by preexisting and independent operations.

After feedstocks are procured and equipment is installed, award activities would proceed to converting feedstocks to sugars utilizing AVAPCO's American Value Added Pulping (AVAP) process. The AVAP process uses a series of steps in controlled, contained environments within the pilot plant equipment to facilitate the breakdown and chemical conversion of feedstocks. Resulting products, including sugars, would be separated during this process. Each feedstock would produce a minimum of approximately 400 kg of raw sugar.

Both C5 sugars (sugars that have five carbon atoms) and C6 sugars (six carbons) would be produced. The sugars would be processed to produce two additional grades of sugar: conditioned and polished. Conditioned sugars would be produced by filtering after adjusting the pH (for C5 sugars) or clumping (for C6 sugars) of raw sugar samples. A portion of the resulting conditioned sugars would be passed through activated carbon and ion exchange columns (part of the size-exclusion chromatography unit) to produce polished sugar samples. Each sample of sugar (i.e. by grade and feedstock) would then be evaluated to determine value and convertibility to commercially viable end products. Evaluation activities would include conversion of sugars into 1,4-Butanediol (BDO) and ethanol.

Conversion to BDO would be completed by Genomatica at their laboratory facilities in San Diego, CA using a genetically modified nonpathogenic strain of bacteria (*Escherichia coli*). Approximately 10 kg of sugar would be shipped to Genomatica for conversion activities. Approximately 1 liter of BDO would be produced.

Conversion to ethanol would occur at the AVAPCO facility using a commercially available, genetically modified strain of yeast (*Saccharomyces cerevisiae*). Approximately 7.5 liters of ethanol would be produced then analyzed for contaminants. Ethanol samples would be shipped to LanzaTech/LanzaJet for evaluation within purpose-built laboratory facilities. LanzaTech/LanzaJet would report to AVAPCO if the ethanol samples meet quality standards for conversion to aviation biofuel.

Additional sugar samples (upwards of 1200kg total) would be sent to other independent organizations that perform conversion activities as part of their regular operations within purpose-built laboratory facilities. Such organizations would include BASF, Arbiom, and Corbion. Conversion activities would evaluate sugar convertibility into commercially viable products such as lactic acid and proteins.

All facilities at AVAPCO and Genomatica are preexisting purpose-built facilities for the type of work to be conducted for this award. While equipment would be installed at the AVAPCO biorefinery facility following Process Safety Management (PSM) requirements, facility modifications would not be required for any facility involved with this award. Proper performance of installed equipment would be verified prior to use for award activities. Facilities would continue to operate under existing permits. Award activities would involve the handling and use of hazardous materials, including industrial solvents, chemical reagents, and heavy machinery. All such handling and storage would occur within controlled laboratory and plant settings at AVAPCO and Genomatica facilities and would follow existing policies and procedures for handling and disposal of these materials. Handling and disposal of genetically modified organisms (GMOs) at all facilities would be done in accordance with existing federal, state, and local laws and regulations. All facilities handling GMOs for this award have preexisting policies and procedures regarding the proper handling and disposal of GMOs. All GMOs used for this award would be classified as Biosafety Level 1 (BSL-1) organisms. Award activities do not include genetic engineering. Existing corporate health, safety, and environmental policies and procedures would be followed at all facilities, including: personnel training, proper personal protective equipment (PPE), engineering controls, monitoring, and internal assessments.

Additional award activities would include those of an intellectual, academic, and analytical nature. Such activities would include the development of modules for educational use, which would be a collaborative effort between AVAPCO and Clark Atlanta University (CAU) (Atlanta, GA). Other activities would involve the completion of life cycle analyses (LCAs) and technoeconomic analyses (TEAs).

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Bioenergy Technologies Office (BETO)

This NEPA determination does not require a tailored NEPA Provision.

NEPA review completed by Dan Cahill, 1/26/2022.

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: **Roak Parker**
NEPA Compliance Officer

Date: 1/26/2022

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: _____

Field Office Manager

Date: _____