Financial Assistance
Notice of Funding Opportunity
Part 1

U.S. Department of Energy (DOE)
Bioenergy Technologies Office
Sustainable Propane and Renewable Chemicals (SPARC)
Notice of Funding Opportunity Number: DE-FOA-0003518

Full Applications due: 5/30/2025, 5:00 PM ET

Modifications to this NOFO will be posted on eXCHANGE and Grants.gov. Grants.gov will automatically notify applicants when a NOFO modification is processed. Applicants must be registered to this NOFO in Grants.gov to receive email notifications. See Registration Requirements in Part 2 of this NOFO.

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Before You Begin

Navigating the Notice of Funding Opportunity

The OMB Memorandum M-24-11 directs federal agencies to reduce the burden on applicants in the Notice of Funding Opportunity (NOFO) process and limit the length of the NOFO information requests. With Fiscal Year (FY) 2025 NOFOs, DOE has separated the NOFO into two parts.

The NOFO Part 1 describes the specific DOE programmatic goals and evaluation criteria, eligibility, and other components that are specific to each funding opportunity. The NOFO Part 2 includes the fixed DOE requirements that generally do not change from NOFO to NOFO, including standard information for the application phase, expectations for award negotiations, and post-award requirements. Applicants must review both the NOFO Part 1 and the NOFO Part 2 prior to applying. To facilitate navigation, you will find links throughout this document to additional information found in Part 2.

There are several required one-time actions applicants must take before applying to this NOFO. Some of these actions may take several weeks, so it is vital applicants build in enough time to complete them. Failure to complete these actions could interfere with application or negotiation deadlines or the ability to receive an award if selected. If you have previously completed the necessary registrations, make sure your registration is active and up to date. All registrations are free. Please refer to NOFO Part 2, *Get Registered*, for additional information.

This announcement is published in conjunction with NOFO Part 2 version 1.0.

I. Basic Information

A. Key Facts

Issuing Agency	Department of Energy, Office of Energy Efficiency and Renewable Energy, Bioenergy Technologies Office
Funding Opportunity Title	Sustainable Propane and Renewable Chemicals (SPARC)
Announcement Type	Initial
Funding Opportunity Number	DE-FOA-0003518
Funding Instrument	Cooperative Agreements
Assistance Listing Number	81.087
Funding Opportunity Description	
Program Goals & Objective(s)	This NOFO supports BETO's research and development (R&D) priorities in the areas of Conversion R&D. Specifically, it supports research and development of domestic chemicals and fuels from a variety of biomass and waste resources. Producing chemicals and propane/liquid petroleum gas (LPG) from renewable feedstocks helps to safeguard domestic supply chains, secure energy independence, support rural economies, and improve sustainability in the industry. See section III.B, Program Goals and Objectives, for metrics and outcomes from this NOFO.

KEY DATES

Notice of Funding Opportunity Issue Date:
January 10, 2025

Informational Webinar:
January 22, 2025

Concept Paper Deadline:
3/14/2025, 5PM ET

Application Deadline:
5/30/2025, 5PM ET

Anticipated Selection Notification Date:
October 2025

Anticipated Award Date:
January 2026

Estimated Period of Performance:
January 2026 – December 2028

Topic Areas	• Topic Area 1: Bio-based Chemicals • Topic Area 2: Bio-based Propane/LPG
Eligible Applicants	• Domestic Entities (Institutions of higher education; for-profit entities; nonprofit entities; state and local government entities; and Indian Tribes, as defined in section 4 of the Indian Self Determination and Education Assistance Act, 25 U.S.C. § 5304 • DOE/NNSA FFRDCs are eligible to participate as a subrecipient but are not eligible to apply as a recipient. • Non-DOE/NNSA FFRDCs are eligible to participate as a subrecipient but are not eligible to apply as a recipient. • Federal agencies and instrumentalities (other than DOE) are eligible to participate as a subrecipient but are not eligible to apply as a recipient.
eXCHANGE URL and Helpdesk	https://eere-eXCHANGE.energy.gov EERE-ExchangeSupport@hq.doe.gov – include NOFO name and number in the subject line.

1. Funding Details

Multiple Topic Areas

Approximate total available funding including all topic areas: Up to $23,000,000* in FY25

*Subject to availability of appropriations

Topic Area 1: Bio-based Chemicals

- Approximate total available funding: Up to $15,000,000 in FY25
- Approximate number of awards: 0-8
- Approximate dollar amount of individual awards: $1,000,000 - $2,500,000 (Federal Share)
- Minimum cost share required: 20% (10% for Tribes and Tribal Nations)
- Approximate award project period: 36 months
- Anticipated length of budget periods: Budget period 1: 0-6 months, Budget period 2: 12-18 months, Budget period 3: 12-18 months

Topic Area 2: Bio-based Propane/LPG

- Approximate total available funding: Up to $8,000,000 in FY25
- Approximate number of awards: 0-4
- Approximate dollar amount of individual awards: $1,000,000 - $2,000,000 (Federal Share)
- Minimum cost share required: 20% (10% for Tribes and Tribal Nations)
- Approximate award project period: 36 months

- Anticipated length of budget periods: Budget period 1: 0-6 months, Budget period 2: 12-18 months, Budget period 3: 12-18 months

2. Period of Performance

DOE anticipates making awards, comprised of multiple budget periods. If applicable, project continuation will be contingent upon DOE's Go/No-Go decision. For a complete list and more information on the Go/No-Go review, see the NOFO Part 2, *Award Administration Information*. Funding for all budget periods, including the initial budget period, is not guaranteed.

B. Executive Summary

Through this Sustainable Propane and Renewable Chemicals (SPARC) NOFO, BETO seeks to continue to advance EERE's goals and DOE's commitment to pushing the frontiers of science and engineering and catalyzing clean energy jobs through RD&D. The NOFO supports the DOE Clean Fuels & Products Shot™ by supporting R&D of high potential chemicals from renewable biomass. The NOFO also supports the Industrial Heat Shot™ to develop new pathways to produce renewable propane and liquid petroleum gases (LPG) from a variety of biomass and waste resources. Both topic areas also support goals found in the Industrial Decarbonization Roadmap, which outlines numerous priorities for reducing industrial sector emissions in the most cost-effective manner, and the BETO Multi Year Program Plan, which highlights priorities for the production of chemicals, products, and fuels.

C. Agency Contact Information

sparcnofo@hq.doe.gov.

II. Eligibility

To be considered for substantive evaluation, an applicant's submission must meet the criteria set forth below. If the application does not meet these eligibility requirements, it will be considered ineligible and removed from further evaluation and ineligible for any award. DOE will not make eligibility determinations for potential applicants prior to the date on which applications to this NOFO must be submitted. The decision whether to apply in response to this NOFO lies solely with the applicant. The information included here is specific to eligibility requirements for this NOFO. For eligibility requirements applicable to all NOFOs, please consult the NOFO Part 2, *Eligibility*.

A. Eligible Applicants

To be considered for substantive evaluation, an applicant's submission must meet the criteria set forth below. If the application does not meet these eligibility requirements, it will be considered ineligible and removed from further evaluation.

1. Domestic Entities

Domestic entities are eligible to apply as recipients or subrecipients. The following types of domestic entities are eligible to participate as a recipient or subrecipient of this NOFO:

- Institutions of higher education;
- For-profit organization;
- Nonprofit organization;
- State and local governmental entities; and
- Indian Tribes, as defined in section 4 of the Indian Self-Determination and Education Assistance Act, 25 U.S.C. § 5304[1]

DOE/NNSA FFRDCs are eligible to participate as a subrecipient but are not eligible to apply as a recipient.

To qualify as a domestic entity, the entity must be organized, chartered, or incorporated (or otherwise formed) under the laws of a particular state or territory of the United States or under the laws of the United States; have majority domestic ownership and control; and have a physical place of business in the United States.

2. Foreign Entity Participation

In general, foreign entities are not eligible to apply as either a recipient or subrecipient. In limited circumstances, DOE may approve a waiver to allow a foreign entity to participate as a recipient or subrecipient.

[1] "**Indian Tribe**," for the purposes of this NOFO and as defined in in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. § 5304), means any Indian tribe, band, nation, or other organized group or community, including any Alaska Native village or regional or village corporation as defined in or established pursuant to the Alaska Native Claims Settlement Act (85 Stat. 688) [43 U.S.C. § 1601, et seq.], which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians. Federally Recognized Indian Tribes are also considered disadvantaged communities for the purposes of Justice40 requirements in this NOFO per https://www.whitehouse.gov/wp-content/uploads/2023/01/M-23-09_Signed_CEQ_CPO.pdf.

A foreign entity may submit an application to this NOFO, but the application must be accompanied by an explicit written waiver request. Likewise, if the applicant seeks to include a foreign entity as a subrecipient, the applicant must submit a separate explicit written waiver request in the application for each proposed foreign subrecipient. Please see NOFO Part 2, *Application Content Requirements* for the requirements for submission of a foreign entity waiver request. The applicant does not have the right to appeal DOE's decision concerning a waiver request.

Recipients must only
be legally formed in the United States and have a physical location for business operations in the United States.

Entities that are organized, chartered, or incorporated (or otherwise formed) under the laws of the United States or a particular state or territory of the United States and have a physical location for business operations in the United States are eligible to apply for funding as a recipient or subrecipient.

Foreign Entity Participation
A foreign entity is eligible to apply for funding as a recipient if it designates in the application a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a state or territory of the United States to be the recipient. The application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate.

Foreign entities may request a waiver of the requirement to designate a subsidiary in the United States as the recipient in the application (i.e., a foreign entity may request that it be the recipient). To do so, the applicant must submit an explicit written waiver request in the application.

NOFO Part 2, *Application Content Requirements* lists the information that must be included in a request to waive this requirement. The applicant does not have the right to appeal DOE's decision concerning a waiver request.

Participant Limitations
Participation of the following entities are limited as follows.

- DOE FFRDCs[2] are eligible to participate as a subrecipient but are not eligible to apply as a recipient.
- Non-DOE FFRDCs are eligible to participate as a subrecipient but are not eligible to apply as a recipient.
- Federal agencies and instrumentalities (other than DOE) are eligible to participate as a subrecipient but are typically not eligible to apply as a recipient.

Performance of Work in the United States
All work for the awards under this NOFO must be performed in the United States. To request a waiver of this requirement, the applicant must submit an explicit waiver request in the application. Absent an approved waiver, such costs will not be allowable under the award. The NOFO Part 2, *Application Content Requirements* lists the requirements for submission of a foreign work waiver request.

[2] FFRDCs are public-private partnerships that conduct research for the U.S. government. A listing of FFRDCs can be found at http://www.nsf.gov/statistics/ffrdclist/.

Ineligible Participants
The following entities are ineligible for participation in this NOFO as a recipient, subrecipient, or subcontractor.

- In accordance with 2 CFR 200.214, entities banned from doing business with the U.S. government such as entities debarred, suspended, or otherwise excluded from or ineligible for participating in federal programs.
- Entities identified on Department of the Treasury Office of Foreign Assets Control Treasury's Sanctions Program Specially Designated Nationals list are prohibited from doing business with the United States government and are not eligible. See OFAC - Sanctions List Service (treas.gov).
- Nonprofit organizations described in Section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995, are not eligible to apply for funding.

Entity of Concern Prohibition
Entities of Concern are prohibited from participating in projects selected under this NOFO (see NOFO Part 2, *Eligibility, Other Eligibility Information, Entity of Concern Prohibition* section for details and definitions).

B. Limitation on Number of Concept Papers and Applications Eligible for Review

An entity may submit more than one concept paper and associated application to this NOFO provided that each describes a unique, scientifically distinct project concept and an eligible concept paper was submitted for each Full Application.

C. Cost Sharing

Applicants are expected to follow through on estimated cost share commitments proposed in their applications if selected for award negotiations. Please refer to the NOFO Part 2, *Eligibility* for more information on Cost Sharing.

1. Cost Share Requirements

The cost share must be at least 20% of the total project costs[3] for research and development.[4]

Tribes and Tribal Nation applicants are required to provide only a minimum 10% cost share pursuant to EERE's blanket cost share reduction applicable to NOFOs issued after October 3, 2024, entitled Determination to Reduce Non-Federal Cost Share Requirements for Tribes and Tribal Nations Applying for Funding from the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy.

[3] Total project costs are the sum of the government share, including FFRDC costs if applicable, and the recipient share of project costs.
[4] Energy Policy Act of 2005, Pub. L. 109-58, sec. 988. Also see 2 CFR 200.306 and 2 CFR 910.130 for additional cost sharing requirements.

Applications that do not meet the minimum required cost share will be deemed ineligible during the initial compliance review and will not be further reviewed. The cost share must come from non-federal sources unless otherwise allowed by law.

The cost share percentage is calculated by dividing the cost share by the total allowable project costs for the award where the total allowable project costs include government share (including FFRDC costs if applicable) and cost share. To help applicants calculate proper cost share amounts, DOE has included a cost share information sheet and sample cost share calculation in the NOFO Part 2, *Eligibility—Cost Sharing, Cost Share Calculation Examples*.

D. FFRDC Eligibility Criteria

1. DOE and Non-DOE FFRDCs as a Subrecipient

As long as they have no conflict, DOE and non-DOE FFRDCs may be proposed as a subrecipient on another entity's application subject to the following guidelines:

Authorization for non-DOE FFRDCs

The federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with its authority under its award.

Authorization for DOE FFRDCs

The cognizant Contracting Officer for the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization:

Authorization is granted for the Laboratory to participate in the proposed project. The work proposed for the Laboratory is consistent with or complementary to the missions of the Laboratory and will not adversely impact execution of the DOE assigned programs at the Laboratory.

The value of and funding for the FFRDC portion of the work will not normally be included in the award. DOE FFRDCs participating as a subrecipient on a project will be funded directly through the DOE Work Authorization process in accordance with DOE O 412.1A. Non-DOE FFRDCs participating as a subrecipient will be funded through an interagency agreement with the sponsoring agency.

Although the FFRDC portion of the work is excluded from the award, the applicant's cost share requirement will be based on the total cost of the project, including the applicant's, the subrecipient's, and the FFRDC's portions of the project.

All DOE FFRDCs are required to enter into a Cooperative Research and Development Agreement[5] (CRADA) or, if the role of the DOE FFRDC is limited to technical assistance and intellectual property is not anticipated to be generated from the DOE FFRDC's work, a Technical Assistance Agreement (TAA), with

[5] A cooperative research and development agreement is a contractual agreement between a national laboratory contractor and a private company or university to work together on research and development. For more information, see https://www.energy.gov/gc/downloads/doe-cooperative-research-and-development-agreements

at least the recipient. A fully executed CRADA or TAA must be in place or be compliant with a Master Scope of Work process prior to the FFRDC starting work directly allocable to the FA award.

A CRADA is used to ensure accountability for project work and provide the appropriate management of IP, e.g., data protection and background IP. A Data Management Plan is not suited for this purpose.

C. Responsibility
The recipient will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues, including but not limited to disputes and claims arising out of any agreement between the recipient and the FFRDC.

The FFRDC effort, in aggregate, shall not exceed 50% of the total project cost.

III. Program Description

A. Program Purpose

The Office of Energy Efficiency and Renewable Energy (EERE) advances applied research, development, demonstration, and deployment projects to support the adoption and commercialization of energy innovations across a range of technologies and sectors. These innovations power our grid with low-carbon renewable energy, enable sustainable transportation and fuels, reduce energy consumption and emissions from our buildings and industries, and drive growth and improvement in domestic manufacturing and supply chains.

EERE is issuing Notice of Funding Opportunity (NOFO) DE-FOA-0003518 on behalf of the Bioenergy Technologies Office (BETO). BETO supports the research, development, and demonstration (RD&D) of technologies that mobilize renewable carbon resources across the U.S. economy. BETO works to develop innovative solutions to enable an economically secure domestic bioeconomy, increasing global competitiveness, while reducing environmental impacts through:

1) Developing innovative technology pathways for affordable fuels and products,
2) Advancing clean energy sources, and
3) Generating domestic jobs to support the growth of the U.S. bioeconomy.

Through this SPARC NOFO, BETO seeks to continue to advance EERE's goals and DOE's commitment to pushing the frontiers of science and engineering and catalyzing clean energy jobs through RD&D. The NOFO supports the DOE Clean Fuels & Products Shot™ by supporting R&D of high potential chemicals from renewable biomass. The NOFO also supports the Industrial Heat Shot™ to develop new pathways to produce renewable propane and liquid petroleum gases (LPG) from a variety of biomass and waste resources. Both topic areas also support goals found in the Industrial Decarbonization Roadmap, which outlines numerous priorities for reducing industrial sector emissions in the most cost-effective manner, and the Multi-year Program Plan, which highlights priorities for the production of chemicals, products, and fuels.

B. Program Goals and Objectives

This SPARC NOFO supports BETO's R&D priorities in the areas of Conversion R&D. Specifically, it supports research and development of domestic chemicals and fuels from a variety of biomass and waste resources. Producing chemicals and propane/liquid petroleum gas (LPG) from renewable feedstocks helps to safeguard domestic supply chains, secure energy independence, support rural economies, and improve global competitiveness of the industry.

The chemical industry is fundamental to American manufacturing, with more than 96% of U.S. goods manufactured using products from the chemical sector.[6] The U.S. is the world's second-largest chemicals producer, and the sector directly employs over half a million people.[7] Increasing U.S. production of chemicals through bio-based chemical production will help boost American

[6] https://www.cisa.gov/resources-tools/resources/chemical-sector-profile
[7] https://www.americanchemistry.com/media/files/acc/chemistry-in-america/data-industry-statistics/the-business-of-chemistry-by-the-numbers/files/business-of-chemistry-by-the-numbers.

competitiveness in the global chemical industry as well as in the key emerging areas of biotechnology and biomanufacturing. Investment in innovative lower-cost production pathways can further enable re-shoring of American chemical manufacturing and reduce reliance on other countries for essential chemical products. In addition, the use of domestic biomass resources for chemicals will help support resilient domestic supply chains and grow rural economies. When considering the energy used for both feedstocks and heat and power, the chemical industry is the largest single energy user and emissions producer in the U.S. industrial sector.[8] Increasing bio-based chemical production can also support sustainable growth of the industry by increasing energy efficiency and reducing harmful emissions.

BETO held a Conversion Engines workshop in September 2024 to solicit feedback on potential future research areas. The feedback received from the sessions on industrial chemicals suggested that a key barrier to the commercialization of bio-based chemicals is understanding and meeting downstream requirements and performance for new production processes that involve multiple partners along the value chain. This issue can include achieving sufficient purity and removal of contaminants that may be harmful to further processing or formulation steps or detrimental to final product performance.

The SPARC NOFO also supports U.S. production of sustainable propane fuel. According to the 2020 Residential Energy Consumption Survey, 4.2% of US households use propane as the primary heating fuel with 7.8% of homes in the Midwest using propane as the primary heating fuel.[9] Rural households used 80% of all U.S. propane consumption (3.4 billion gallons in 2020).[10] Propane and LPG as fuels provide a unique value proposition compared to other biofuels. Unlike biogas or renewable natural gas, propane/LPG does not require pipeline access for distribution, allowing its use in rural and remote communities that are otherwise present access challenges. These applications include home heating/cooling, as a transportation fuel, and for local/microgrid electricity production. Further development of pathways that can produce renewable propane/LPG would result in lower energy costs for households and end-users that rely on this as a source of fuel. Thus, there are numerous benefits to the use of renewable propane/LPG.

Detailed technical descriptions of the specific Topic Areas are provided in the sections that follow.

C. Expected Performance Goals

Topic Area 1: Bio-based Chemicals

By the conclusion of the project (if selected), projects are expected to achieve the following outcomes:

- Production of a sufficient quantity of chemical product at a purity level appropriate for product or formulation testing. This quantity must be defined and justified by the applicant for the specific chemical and product application, and it must support the proposed performance testing plan. This quantity should, however, be a minimum of 1 kg.
- Completion of initial performance testing for the chemical product or formulation demonstrating acceptable performance for the target end application. The specific tests and their significance must be defined and justified by the applicant for the specific chemical and product application. If an appropriate industry standard specification (ex. ASTM) exists for the

[8] https://www.eia.gov/outlooks/aeo/
[9] https://www.eia.gov/consumption/residential/data/2020/c&e/pdf/ce2.1.pdf
[10] https://www.eia.gov/consumption/residential/data/2020/c&e/pdf/ce4.1.pdf

chemical product or application, the applicant should complete testing to demonstrate performance that meets the specification.
- Reduction in net life cycle greenhouse gas emissions relative to the conventional incumbent chemical of at least 70% by the end of the project.

Topic Area 2: Bio-based Propane/LPG
By the conclusion of the project (if selected), projects are expected to achieve the following outcomes:

All Topic Area 2 projects:
- Finished Propane/LPG that meets ASTM D1835 specifications
- System energy consumption of no more than 50% of the higher heating value of the finished propane/LPG
- Reduction in net life cycle greenhouse gas emissions relative to fossil propane/LPG of at least 70%
- Quantification of the process emissions including, at a minimum, sulfur oxides, nitrogen oxides, volatile organic compounds, particulate emissions, and methane

Subtopic Area 2a must, in addition, achieve the following outcome:
- System time-on stream of at least 500 cumulative hours

Subtopic Area 2b must, in addition, achieve the following outcome:
- Catalyst time-on stream of at least 500 continuous hours

D. Teaming Partner List

DOE is compiling a Teaming Partner List to facilitate the formation of project teams for this NOFO. The Teaming Partner List allows organizations that may wish to participate on a project to express their interest to other applicants and explore potential partnerships.

The Teaming Partner List will be available on eXCHANGE and will be regularly updated to reflect new teaming partners who provide their organization's information.

SUBMISSION INSTRUCTIONS: View the Teaming Partner List by visiting the eXCHANGE homepage and clicking on "Teaming Partners" within the left-hand navigation pane. This page allows users to view published Teaming Partner Lists. To join the Teaming Partner List, submit a request within eXCHANGE. Select the appropriate Teaming Partner List from the drop-down menu, and fill in the following information: Investigator Name, Organization Name, Organization Type, Topic Area, Background and Capabilities, Website, Contact Address, Contact Email, and Contact Phone.

DISCLAIMER: By submitting a request to be included on the Teaming Partner List, the requesting organization consents to the publication of the above-referenced information. By facilitating the Teaming Partner List, DOE is not endorsing, sponsoring, or otherwise evaluating the qualifications of the individuals and organizations that are identifying themselves for placement on this Teaming Partner List. DOE will not pay for the provision of any information, nor will it compensate any applicants or requesting organizations for the development of such information.

E. Topic Areas

Topic Area 1: Bio-based Chemicals

Producing chemicals from renewable feedstocks helps to secure domestic supply chains, support rural economies, and improve sustainability in the industry. Importantly, the U.S. already has significant biomanufacturing capacity for ethanol which can be built upon to produce a broader slate of chemical end-products. However, adoption of new chemical production pathways is challenging due to complex supply chains with many different stakeholders and the need for extensive product quality testing for new processes.

Topic Area 1 will support development and adoption of new production methods for value-added chemicals from biomass. Chemical products produced in significant volume in the U.S. or globally from a variety of biomass and waste feedstocks are of interest. The focus of this topic area is on producing direct replacement chemicals (i.e. the same chemical molecules as those currently produced at large volumes), rather than functional replacement chemicals with different chemistries. By the conclusion of a project, the project must produce a sufficient quantity of the target chemical from real feedstocks and complete feasibility testing in collaboration with relevant manufacturing and downstream partners in the value chain. Project teams should represent the chemical value chain and must include a formulator and/or end user partner as part of the team.

Topic Area 1 Specific Areas of Interest

Specific areas of interest for Topic Area 1 include, but are not limited to:

- Technologies that can be scaled through the utilization or modification of existing U.S. ethanol fermentation infrastructure
- Technologies that produce 3-hydroxypropionic acid
- Technologies that use whole-kernel corn as a feedstock
- Technologies that combine biological and chemical processes

Topic Area 1 Specific Requirements

- Applicants must include baseline techno-economic and life cycle analysis (TEA/LCA) as part of their application.
- Applicants must estimate improvements to cost and net life cycle greenhouse gas (GHG) emissions that would result from the proposed technology if successful. Applicants must describe relevant assumptions and data that support the estimate.
- Applicants must include a formulator and/or an end user partner as part of their project team.
- Applicants must produce a chemical product that is currently made in the U.S. at 0.5 MMT/year or more and/or globally at 1 MMT/year or more.
- Applicants must clearly identify the targeted chemical product.
- Applicants must clearly identify the chosen eligible bio-based feedstock. Information on eligible feedstocks can be found in Appendix A.

Topic Area 1 Metrics and Outcomes

By the conclusion of the project (if selected), projects are expected to achieve the following outcomes:

- Production of a sufficient quantity of chemical product at a purity level appropriate for product or formulation testing. This quantity must be defined and justified by the applicant for the specific chemical and product application, and it must support the proposed performance testing plan. This quantity should, however, be a minimum of 1 kg.

- Completion of initial performance testing for the chemical product or formulation demonstrating acceptable performance for the target end application. The specific tests and their significance must be defined and justified by the applicant for the specific chemical and product application. If an appropriate industry standard specification (ex. ASTM) exists for the chemical product or application, the applicant should complete testing to demonstrate a performance that meets the specification.
- Reduction in net life cycle greenhouse gas emissions relative to the conventional incumbent chemical of at least 70% by the end of the project.

Topic Area 1 Applications Specifically Nots of Interest
The following types of applications will be deemed nonresponsive and will not be reviewed or considered (Please also refer to the Responsiveness Review section below):

- Applications that fall outside the technical parameters specified in Background and Context above and the Topic Areas section above.
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).
- Applications that utilize feedstocks other than those eligible feedstocks as set forth in Appendix A.
- Applications that produce specialty chemicals or pharmaceuticals.
- Applications that produce functional replacement chemicals that are chemically different from those currently produced at the target scale (U.S. production at 0.5 MMT/year or more and/or global production at 1 MMT/year or more).
- Applications that use model compounds as opposed to real feedstocks.

Topic Area 2: Bio-based Propane/LPG

Topic Area 2 seeks to pursue new pathways for the production of sustainable liquefied propane and/or petroleum gases (LPG) from a variety of feedstocks including municipal waste, agricultural residues, forest resources, and fats, oils, and grease.

Subtopic Area 2a: Gaseous Intermediate Upgrading to LPG
Gaseous conversion routes are viewed as a promising precursor to producing LPG. Subtopic 2a seeks to mature pathways that can convert various gaseous intermediates including biogas, carbon dioxide, and syngas, into LPG. Many of these gaseous intermediates are readily available and can offer near term opportunities for technology development and deployment. By the conclusion of these projects, they should be ready for pre-pilot testing and integration of these processes.

Subtopic Area 2b: Intermediate Energy Crop Conversion to LPG
Nearly all renewable propane/LPG currently produced is a co-product of the hydrotreated esters and fatty acids (HEFA) process at renewable diesel or sustainable aviation fuel (SAF) facilities that utilize fats, oils, and greases as feedstocks. However, these feedstocks (yellow grease, animal fats, soybean oil) are, or are very nearly, fully utilized. To realize sustainable fuel production goals, new oil seeds are actively being developed, and compatibility with HEFA catalysts is critical to ensuring that existing refineries can utilize them. Subtopic Area 2b will improve and optimize catalyst performance for these 'emerging oil

seeds' and accelerate the introduction of these new oil seeds to market. Applicants, therefore, must start with engineered forms of catalyst for these projects as opposed to developing new catalysts. Project teams must include a catalyst manufacturer as part of their team. By the conclusion of these projects, recipients should be ready for pilot-testing of these catalysts and feedstocks for larger volume propane/LPG production.

Subtopic Area 2b is complementary to the ongoing BETO Renewable Carbon Resources Regional Biomass Resource Hub Initiative, in which several entities are growing and developing supply chains for these intermediate energy crops, specifically emerging oil seeds including carinata, camelina, and pennycress. Subtopic Area 2b will also support co-processing efforts which are a near term opportunity for expanding SAF production volumes.

Topic Area 2 Specific Areas of Interest

- Small-scale or modular technologies for conversion of gaseous intermediates to propane/LPG
- Technologies that can be deployed in rural and/or remote communities
- Catalytic technologies that can accept additional oil-seed crops, especially camelina, carinata, pennycress, and oil producing annual cover crops

Topic Area 2 Specific Requirements

- Applicants must include baseline techno-economic, life cycle analysis (TEA/LEA) as part of their technical volume
- Applicants must include the baseline system energy consumption of their process as part of their application
- Applicants must include a catalyst manufacturer as part of their project team
- Applicants must utilize engineered forms of catalyst for these projects
- Applicants must utilize an eligible feedstock. Information on eligible feedstocks can be found in Appendix A

Topic Area 2 Metrics and Outcomes

By the conclusion of the project (if selected), projects are expected to achieve the following outcomes:

All Topic Area 2 projects:

- Finished Propane/LPG that meets ASTM D1835 specifications
- System energy consumption of no more than 50% of the higher heating value of the finished propane/LPG
- Reduction in net life cycle greenhouse gas emissions relative to fossil propane/LPG of at least 70%
- Quantification of the process emissions including, at a minimum, sulfur oxides, nitrogen oxides, volatile organic compounds, particulate emissions, and methane.

Subtopic Area 2a must, in addition, achieve the following outcome:

- System time-on stream of at least 500 cumulative hours

Subtopic Area 2b must, in addition, achieve the following outcome:

- Catalyst time-on stream of at least 500 continuous hours

Topic Area 2 Applications Specifically Nots of Interest

The following types of applications will be deemed nonresponsive and will not be reviewed or considered (Please also refer to the Responsiveness Review section below):

- Applications that fall outside the technical parameters specified in Background and Context above and the Topic Areas section above.
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).
- Applications that utilize feedstocks other than those eligible feedstocks as set forth in Appendix A.
- Applications that use model compounds (e.g. model oils or gas streams) as opposed to real feedstocks.

F. Applications Specifically Not of Interest

The following types of applications will be deemed nonresponsive and will not be reviewed or considered (Please also refer to the Responsiveness Review section below):

- Applications that fall outside the technical parameters specified in Background and Context above and the Topic Areas section above.
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the laws of thermodynamics).
- Applications that utilize feedstocks other than those eligible feedstocks as set forth in Appendix A.

Topic Area 1

- Applications that produce specialty chemicals or pharmaceuticals.
- Applications that produce functional replacement chemicals that are chemically different from those currently produced at the target scale (U.S. production at 0.5 MMT/year or more and/or global production at 1 MMT/year or more).
- Applications that use model compounds as opposed to real feedstocks.

Topic Area 2

- Applications that use model compounds (e.g. model oils or gas streams) as opposed to real feedstocks.

G. Statement of Substantial Involvement

DOE anticipates awarding cooperative agre(ements under this NOFO, which include a statement of DOE's "substantial involvement" in the work performed under the resulting awards. For cooperative agreements, DOE does not limit its involvement to the administrative requirements of the award. Instead, DOE has substantial involvement in the direction and redirection of the technical aspects of the project. DOE's substantial involvement in resulting awards may include the following:

A. DOE shares responsibility with the recipient for the management, control, direction, and performance of the project.

B. DOE may intervene in the conduct or performance of work under this award for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities.
C. DOE may redirect or discontinue funding the project based on the outcome of DOE's evaluation of the project at the Go/No-Go decision point(s).
D. DOE participates in major project decision-making processes.

H. Statutory Authority

The programmatic authorizing statute is Energy Policy Act (EPAct) 2005, Pub. L. 109-58, § 931 as codified at 42 U.S.C. § 16231; EPAct 2005 § 932, as codified at 42 U.S.C § 16232.

Awards made under this announcement will fall under the purview of 2 CFR Part 200 as adopted and supplemented by 2 CFR Part 910.

IV. Application Content and Form

This section includes application information specific to this NOFO Part 1. Refer to the NOFO Part 2, *Application Content and Form* for standard information that applies to all DOE NOFOs such as formatting and content requirements, and funding restrictions.

A. Summary

The application process includes *[If applicable, enter multiple]* submission phases: letter of intent, concept paper, application, and to reviewer comments.

Application Submission Phase	Eligibility for Submission
Concept Paper	Required to be submitted by the specified due date and time to be eligible to submit an application
Application	Must be submitted by the specified due date and time to be eligible for comprehensive merit review.
Replies to Reviewer Comments	Required to be submitted by the specified due date and time.

B. Concept Paper

Section	Page Limit	Description
Cover Page	1 page maximum	The cover page should include the project title, the specific announcement Topic Area being addressed (if applicable), both the technical and business points of contact (including the Administrative Officer, if applicable), names of all team member organizations, the project location(s), and any statements regarding confidentiality.
Technology Description	3 pages maximum	Applicants are required to succinctly describe: • The proposed technology, including its basic operating principles and how it is unique and innovative; • The proposed technology's target level of performance (applicants should provide technical data or other support to show how the proposed target could be met); • The current state of the art in the relevant field and application, including key shortcomings, limitations, and challenges; • How the proposed technology will overcome the shortcomings, limitations, and challenges in the relevant field and application;

		• The potential impact that the proposed project would have on the relevant field and application; • How the proposed location of the proposed project will support technology development and long-term success; • The key technical risks/issues associated with the proposed technology development plan; • The impact that DOE funding would have on the proposed project; and • Any potential impacts on Indian Tribes and describe how the applicant would engage with a potentially impacted Indian Tribe(s).
Addendum	1 pages maximum	Applicants are required to succinctly describe the qualifications, experience, and capabilities of the proposed project team, including: • Whether the Principal Investigator (PI) or Lead Project Manager (LPM) and project team have the skill and expertise needed to successfully execute the project plan; • Whether the applicant has prior experience which demonstrates an ability to perform tasks of similar risk and complexity; • Whether the applicant has worked together with its teaming partners on prior projects or programs; • Whether the applicant has adequate access to equipment and facilities necessary to accomplish the effort and/or clearly explain how it intends to obtain access to the necessary equipment and facilities; and • Applicants may provide graphs, charts, or other data to supplement their Technology Description.

DOE makes an independent assessment of each concept paper based on the technical review criteria for Concept Papers described below. DOE will encourage a subset of applicants to submit applications. Other applicants will be discouraged from submitting an application. Please see NOFO Part 2, *Selection and Award Notices—Concept Paper Notifications*.

C. Application Content Requirements

Each application must be limited to a single concept. Applications must conform to the following requirements and must not exceed the stated page limits. Please refer to the NOFO Part 2, *Application Content and Form* for a complete list of application requirements. Detailed guidance on the content and form of NOFO-specific requirements is provided following the Summary of Application Requirements table below.

1. Covered Individual Definition, Designation, and Responsibility

Several of the Application Content Requirements listed below and in the NOFO Part 2 are required of covered individuals.

For the purposes of this NOFO, a Covered Individual means an individual who (a) contributes in a substantive, meaningful way to the development or execution of the scope of work of a project proposed for funding by DOE, and (b) is designated as a covered individual by DOE.

DOE designates as covered individuals any principal investigator (PI); project director (PD); co-principal investigator (Co-PI); co-project director (Co-PD); project manager; and any individual regardless of title that is functionally performing as a PI, PD, Co-PI, Co-PD, or project manager. Status as a consultant, graduate (master's or PhD) student, or postdoctoral associate does not automatically disqualify a person from being designated as a "covered individual" if they meet the definition in (a) above.

The applicant is responsible for assessing the applicability of (a) above, against each person listed on the application. Further, the applicant is responsible for identifying any such individual to DOE for designation as a covered individual, if not already designated by DOE as described above.

The applicant's submission of a current and pending support disclosure and/or biosketch/resume for a particular person serves as an acknowledgement that DOE designates that person as a covered individual.

DOE may further designate covered individuals during award negotiations or the award period of performance.

DOE may further designate covered individuals during award negotiations or the award period of performance.

2. Summary of Application Requirements

Component	File Format	Page Limit	File Name
Application for Federal Assistance (SF-424)	PDF	n/a	ControlNumber_LeadOrganization_424
Technical Volume	PDF	[25]	ControlNumber_LeadOrganization_TechnicalVolume
Letters of Commitment	PDF	1 page each	ControlNumber_LeadOrganization_LOCs
Statement of Project Objectives	MS Word	[5]	ControlNumber_LeadOrganization_SOPO
Budget Justification Workbook	MS Excel	n/a	ControlNumber_LeadOrganization_Budget_Justification
Subrecipient Budget Justification	MS Excel	n/a	ControlNumber_LeadOrganization_Subrecipient_Budget_Justification

Work Proposal for FFRDC, (see DOE O 412.1A)	PDF	n/a	ControlNumber_LeadOrganization_WP
Authorization for Non-DOE or DOE FFRDCs	PDF	n/a	ControlNumber_LeadOrganization_FFRDCAuth
Waiver for Foreign Entity Participation	PDF	n/a	ControlNumber_LeadOrganization_FEW
Performance of Work in the United States (Foreign Work Waiver)	PDF	n/a	ControlNumber_LeadOrganization_FWW
Resumes (Research and Development (R&D))	PDF	3 pages each	ControlNumber_LeadOrganization_Resumes
Current and Pending Support (for each covered individual)	PDF	n/a	ControlNumber_LeadOrganization_CPS
Digital Persistent Identifier (for each covered individual)	N/A	N/A	Include in Current & Pending Support
Research Security Training Requirement (for each covered individual)	N/A	N/A	Include in Current & Pending Support
Transparency of Foreign Connections	PDF	n/a	BusinessSensitive_ControlNumber_LeadOrganization_TFC
Potentially Duplicative Funding Notice	PDF	n/a	ControlNumber_LeadOrganization_PDFN
Disclosure of Lobbying Activities, if applicable (SF-LLL)	PDF	n/a	ControlNumber_LeadOrganization_SF-LLL
Certification Regarding Lobbying (OMB 4040-0013)	PDF	n/a	ControlNumber_LeadOrganization_Cert Lobbying
Summary for Public Release	PDF	1	ControlNumber_LeadOrganization_Summary
Summary Slide	MS Power Point	1	ControlNumber_LeadOrganization_Slide

3. Technical Volume

The Technical Volume must conform to the following content and form requirements. This volume must address the technical review criteria as discussed in Technical Review Criteria.

Applicants must provide sufficient citations and references to the primary research literature to justify the claims and approaches made in the Technical Volume. However, DOE and reviewers are under no obligation to review cited sources.

The Technical Volume to the application may not be more than 25 pages, including the cover page, table of contents, and all citations, charts, graphs, maps, photos, or other graphics, and must include all information below. The applicant should consider the weighting of each of the technical review criteria (see Technical Review Criteria) when preparing the Technical Volume. Calibri typeface, a black font color, and a font size of 12-point or larger (except in figures or tables, which may be 10-point font). Margins of not less than 1" (>= 1") on every side.

The Technical Volume should clearly describe and expand upon information provided in the concept paper.

Technical Volume Content Requirements Overview	
Section	**Approximate Percent Content of the Technical Volume**
Cover Page	N/A
Project Overview	10%
Technical Description, Innovation, and Impact	30%
Workplan in Statement of Project Objectives	40%
Technical Qualifications and Resources	20%

Cover Page:
The cover page must include all of the following:

- The project title
- Specific NOFO topic areas (if applicable)
- Technical and business POCs
- The project team, including recipient name, entity type and names of all team member organizations
- The project location(s)
- The proposed federal funding level, cost share and period of performance
- Senior/key personnel and other covered individuals
- Statements regarding confidentiality

Project Overview (Approximately 10% of the Technical Volume)
The Project Overview should contain the following information:

- **Background:** The applicant should discuss the history, successes, and current research and development status (i.e., the technical baseline) relevant to the technical topic being addressed in the application.
- **Project Goal:** The applicant should explicitly identify the targeted improvements to the baseline technology and the critical success factors in achieving that goal.
- **DOE Impact:** The applicant should discuss the impact that DOE funding would have on the proposed project. Applicants should specifically explain how DOE funding, relative to prior, current, or anticipated funding from other public and private sources, is necessary to achieve the project objectives.

Technical Description, Innovation, and Impact (Approximately 30% of the Technical Volume)
The Technical Description should contain the following information:

- **Relevance and Outcomes:** The applicant should provide a detailed description of the technology or focus area, including the scientific and other principles and objectives that will be pursued during the project. This section should describe the relevance of the proposed project to the goals and objectives of the NOFO, including the potential to meet specific DOE technical targets

or other relevant performance targets. The applicant should clearly specify the expected outcomes of the project.

- **Feasibility:** The applicant should demonstrate the technical feasibility of the proposed technology and capability of achieving the anticipated performance targets, including a description of previous work done and prior results. This section should also address the project's access to necessary infrastructure (e.g., transportation, water, electricity transmission), including any use of existing infrastructure, as well as to a skilled workforce.
- **Innovation and Impacts:** The applicant should describe the current state-of-the-art in the applicable field, the specific innovation of the proposed technology or focus area, the advantages of proposed technology over current and emerging technologies, and the overall impact on advancing the state-of-the-art/technical baseline if the project is successful. The applicant should also include information on the current techno-economic and life cycle analysis of the proposed technology.

Workplan (Approximately 40% of the Technical Volume)

The Workplan should include a summary of the Project Objectives, Technical Scope, Work Breakdown Structure (WBS), Project Tasks, Milestones, Go/No-Go decision points, and project schedule. A detailed statement of project objectives (SOPO) is separately requested as part of the application. The Workplan should contain the following information:

- **Project Objectives:** The applicant should provide a clear and concise (high-level) statement of the goals and objectives of the project as well as the expected outcomes.
- **Technical Scope Summary:** The applicant should provide a summary description of the overall work scope and approach to achieve the objective(s). The overall work scope is to be divided by performance periods that are separated by discrete, approximately annual decision points (see below for more information on Go/No-Go decision points). The applicant should describe the specific expected end result of each performance period.
- **WBS and Task Description Summary:** The Workplan should describe the work to be accomplished and how the applicant will achieve the milestones, will accomplish the final project goal(s), and will produce all deliverables. The Workplan is to be structured with a hierarchy of performance period (approximately annual), task and subtasks, which is typical of a standard WBS for any project. The Workplan shall contain a concise description of the specific activities to be conducted over the life of the project. The description shall be a full explanation and disclosure of the project being proposed (i.e., a statement such as "we will then complete a proprietary process" is unacceptable). It is the applicant's responsibility to prepare an adequately detailed task plan to describe the proposed project and the plan for addressing the objectives of this NOFO. The summary provided should be consistent with the SOPO. The SOPO will contain a more detailed description of the WBS and tasks.
- **Milestone Summary:** The SOPO should provide a summary of appropriate milestones throughout the project to demonstrate progress and success. A milestone may be either a progress measure (which can be activity based) or a SMART technical milestone. SMART milestones should be Specific, Measurable, Achievable, Relevant, and Timely, and must demonstrate a technical achievement rather than simply completing a task. Unless otherwise specified in the NOFO, the minimum requirement is that each project must have at least one milestone per quarter for the duration of the project with at least one SMART technical milestone per year (depending on the project, more milestones may be necessary to comprehensively demonstrate progress). The applicant should also provide the means by which

the milestone will be verified. The summary provided should be consistent with the Milestone Summary Table in the SOPO.

- **Go/No-Go Decision Points:** The applicant should provide a summary of project-wide Go/No-Go decision points at appropriate points in the Workplan. At a minimum, each project must have at least one project-wide Go/No-Go decision point for each budget period (12 to 18-month period) of the project. See the Key Facts section above for Go/No-Go and budget period information. The applicant should also provide the specific technical criteria to be used to evaluate the project at the Go/No-Go decision point. The summary provided should be consistent with the SOPO. Go/No-Go decision points are considered "SMART" and can fulfill the requirement for an annual SMART milestone.
- **End of Project Goal:** The Workplan should include a summary of the end of project goal(s). At a minimum, each project must have one SMART end of project goal. The summary provided should be consistent with the SOPO.
- **Project Schedule (Gantt Chart or similar):** The applicant should provide a schedule for the entire project, including task and subtask durations, any milestones, and any Go/No-Go decision points.
- **Build America Buy America (BABA) Requirements for Infrastructure Projects:** Within the first two pages of the Workplan, include a short statement on whether the project will involve the construction, alteration, maintenance and/or repair of public infrastructure in the United States. See Build America, Buy America | Department of Energy and 2 CFR 184 for applicable definitions and other information regarding Infrastructure Projects and the Buy America Requirement.
- **Project Management:** The applicant should discuss the team's proposed management plan, including the following:
    - The overall approach to and organization for managing the work;
    - The roles of each project team member;
    - Any critical handoffs/interdependencies among project team members;
    - The technical and management aspects of the management plan, including systems and practices, such as financial and project management practices;
    - The approach to project risk management, including a plan for securing a qualified workforce and mitigating risks to project performance including but not limited to community or labor disputes or conflicts related to siting;
    - Approach to addressing permits and tory approvals, including compliance with any current permits, and any permits and natural or cultural resource issues that could require discretionary permits or approvals;
    - A description of how project changes will be handled;
    - If applicable, the approach to Quality Assurance/Control;
    - How communications will be maintained among project team members.
- **Market Transformation Plan:** The applicant should provide a market transformation plan, including the following:
    - Identification of target market, competitors, and distribution channels for proposed technology along with known or perceived barriers to market penetration, including a mitigation plan.
    - to product development and testing, commercialization timeline, financing, legal/regulatory considerations including intellectual property, infrastructure requirements, etc., and product distribution.
    - Identification of current industry interest, commitments for adoption if the project is successful, and impact of those commitments across the industry.

Technical Qualifications and Resources (Approximately 20% of the Technical Volume)
The Technical Qualifications and Resources should contain the following information:

- A description of the project team's unique qualifications and expertise, including those of key subrecipients;
- A description of the project team's existing equipment and facilities, or equipment or facilities already in place on the proposed project site, that will facilitate the successful completion of the proposed project; include a justification of any new equipment or facilities requested as part of the project;
- Relevant, previous work efforts, demonstrated innovations, and how these enable the applicant to achieve the project objectives;
- The time commitment of the key team members to support the project;
- A description of the technical services to be provided by DOE FFRDCs, if applicable;
- The skills, certifications, or other credentials of the construction and ongoing operations workforce;
- For multi-organizational projects, describe succinctly:
    - The roles and the work to be performed by the project manager and Senior/Key Personnel at the recipient and sub levels;
    - Business agreements between the applicant and sub;
    - How the various efforts will be integrated and managed;
    - Process for making decisions on technical direction;
    - Publication arrangements;
- Strategy to address known resource, including intellectual property and real property, constraints or challenges; and
- Communication plans.

D. Funding Restrictions

Program-specific funding restrictions applicable to awards funded under this NOFO are identified below. Standard funding restrictions are described in the NOFO Part 2, *Funding Restrictions* section.

Applicable Funding Restrictions		
Title	**Location**	**Additional Information**
Allowable Costs	NOFO Part 2	Applicable to awards made under this NOFO
Pre-Award Costs	NOFO Part 2	Applicable to awards made under this NOFO
Performance of Work in the United States (Foreign Work Waiver Requirement)	NOFO Part 2	Applicable to awards made under this NOFO
Foreign Travel	NOFO Part 2	Foreign Travel is allowed for awards made under this NOFO with Contracting Officer Approval
Lobbying	NOFO Part 2	Applicable to awards made under this NOFO

Equipment and Supplies	NOFO Part 2	Purchasing American-made equipment and supplies is applicable to this award.
Build America Buy America Requirements for Infrastructure Projects	NOFO Part 1	Applicable to awards made under this NOFO

1. Build America Requirement for Infrastructure Projects

Awards funded through this NOFO that are for, or contain, construction, alteration, maintenance, or repair of public infrastructure in the United States undertaken by applicable recipient types, require that:

- All iron, steel, and manufactured products used in the infrastructure project are produced in the United States; and
- All construction materials used in the infrastructure project are manufactured in the United States.

Please refer to the NOFO Part 2, *Buy America Requirements for Infrastructure Projects; Required Use of American Iron, Steel, Manufactured Products, and Construction Materials* and 2 CFR Part 184 to determine whether the Buy America Requirement applies and if they should consider the application of the Buy America Requirement in the proposed project's budget and/or schedule. (Note that the Buy America Requirement does not apply to prime recipients that are For-Profit Entities.)

V. Submission Requirements and Deadlines

There are several one-time actions applicants must take before applying to this NOFO. Some of these may take several weeks, so it is vital applicants build in enough time to complete them. Failure to complete these actions could interfere with application or negotiation deadlines or the ability to receive an award if selected. These requirements are outlined in detail in the NOFO Part 2, *Get Registered*.

A. Required Registrations

1. Unique Entity Identifier (UEI) and System for Award Management (SAM)

You must have an active account with SAM.gov. This includes having a Unique Entity Identifier (UEI). SAM.gov registration can take several weeks. To register, go to SAM.gov Entity Registration and click Get Started. From the same page, you can also click on the Entity Registration Checklist for the information you will need to register.

Each applicant must:

1. Be registered in SAM.gov before submitting an application;
2. Provide a valid Unique Entity Identifier in the application; and
3. Continue to maintain an active registration in SAM.gov with current information at all times during which you have an active federal award or an application or plan under consideration by a federal 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, the 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.

2. eXCHANGE

Register and create an account in the eXCHANGE site identified in the Key Facts section of the NOFO Part 1. This account can be used to apply to open NOFOs in eXCHANGE. To view and submit applications to open opportunities under a specific DOE office(s), you must access the applicable instance of the system. You may need to be registered in more than one instance to submit applications for opportunities managed by different DOE offices.

Each organization or business unit, whether acting as a team or a single entity, should use only one account as the contact point for each submission. Applicants must also designate backup points of contact. **This step is required to apply to this NOFO.**

B. Application Package

1. eXCHANGE

The application package requirements are outlined in the Application Content and Form section above. Several templates for application requirements are included in eXCHANGE. To access these materials, select the appropriate NOFO on the Funding Opportunity page of eXCHANGE.

Note: The maximum file size that can be uploaded to the eXCHANGE website is 50MB. Files larger than 50MB cannot be uploaded and hence cannot be submitted for review. If a file is larger than 50MB but is still within the maximum page limit specified in the NOFO, it must be broken into parts and denoted to that effect. For example:

- TechnicalVolume_Part_1
- TechnicalVolume_Part_2

DOE will not accept late submissions that resulted from technical difficulties due to uploading files that exceed 50MB.

In addition to eXCHANGE, the application forms and instructions are available at EERE Funding Application and Management Forms.

Electronic Authorization of Applications and Award Documents
Submission of an application and supplemental information under this NOFO through electronic systems used by the DOE, including eXCHANGE, constitutes the authorized representative's approval and electronic signature.

C. Submission Date and Times

All required submissions must be submitted to the eXCHANGE site identified in the Key Facts section of NOFO Part 1 no later than 5 p.m. ET on the dates provided on Key Facts section.
There may be more than one deadline, depending on whether a letter of intent and a concept paper is required.

Applicants are strongly encouraged to submit all required application documents at least 48 hours in advance of the submission deadline. Under normal conditions (i.e., at least 48 hours before the submission deadline), applicants should allow at least one hour to submit application documents. Once the application documents are submitted in the eXCHANGE site identified in the NOFO Part 1, applicants may revise or update that submission until the expiration of the applicable deadline. If changes are made to any of these documents, the applicant must resubmit them before the applicable deadline. DOE will not extend the submission deadline for applicants that fail to submit required information by the applicable deadline due to server/connection congestion.

D. Intergovernmental Review

This NOFO is not subject to Executive Order 12372, Intergovernmental Review of Federal Programs.

VI. Application Review Information

A. Standards for Application Evaluation

Applications that are determined to be eligible will be evaluated in accordance with this NOFO [by the standards set forth in EERE's Notice of Objective Merit Review Procedure (76 Fed. Reg. 17846, March 31, 2011] and the guidance provided in the "DOE Merit Review Guide for Financial Assistance," effective October 1, 2020, which is available at: https://energy.gov/management/downloads/merit-review-guide-financial-assistance-and-unsolicited-proposals-current.

B. Responsiveness Review

- Project concepts or approaches not based on established scientific principles.
- Project concepts or approaches identified specifically as NOT of interest (see the Applications Specifically Not of Interest section above).

C. Review Criteria

1. Compliance Criteria

All applicant submissions for concept papers and applications must:

- Comply with the applicable content and form requirements listed in Application Content Requirements and Submission Requirements and Deadlines of the NOFO Part 1 and 2;
- Include all required documents;
- Be uploaded successfully in eXCHANGE site indicated in the Key Facts section above including clicking the "Submit" button; and
- Comply with the submission deadline stated in Key Facts.

DOE will not review or consider submissions submitted through means other than the eXCHANGE site indicated in Key Facts, submissions submitted after the applicable deadline, or incomplete submissions.

Applicants must submit a letter of intent and a concept paper by 5:00 p.m. ET on the due date listed on the Key Facts section to be eligible to submit an application. Applicants who do not submit a concept paper are not eligible to submit an application.

Applicants are strongly encouraged to submit all required application documents at least 48 hours in advance of the submission deadline. Under normal conditions (i.e., at least 48 hours before the submission deadline), applicants should allow at least one hour to submit application documents. Once the application documents are submitted in the eXCHANGE site identified in the Key Facts section, applicants may revise or update that submission until the expiration of the applicable deadline. If changes are made to any of these documents, the applicant must resubmit them before the applicable deadline. DOE will not extend the submission deadline for applicants that fail to submit required information by the applicable deadline due to server/connection congestion.

2. Technical Review Criteria

Concept Papers

Concept papers are evaluated based on consideration of the following factors. All sub-criteria are of equal weight.

Concept paper Criterion: Overall NOFO Responsiveness and Viability of the Project (Weight: 100%)
This criterion involves consideration of the following factors:

- The applicant clearly describes the proposed technology, how the technology is unique and innovative, and how the technology will advance the current state of the art;
- The applicant has identified risks and challenges of the technology, regulatory and financial aspects of the proposal including possible mitigation strategies, and has shown the impact that DOE funding and the proposed project would have on the relevant field and application;
- The applicant has the qualifications, experience, capabilities, and other resources necessary to complete the proposed project; and
- The proposed work, if successfully accomplished, would clearly meet the objectives as stated in the NOFO.

Applications

Applications will be evaluated against the technical review criteria shown below. All sub-criteria are of equal weight.

Review Criterion Overview	
Criterion	**Weight**
Technical Merit, Innovation, and Impact	40%
Project Workplan, Metrics, Risks, and Market Transformation Plan	40%
Team and Resources	20%

Criterion 1: Technical Merit, Innovation, and Impact (40%)

This criterion involves consideration of the following factors:

Technical Merit and Innovation

1. Extent to which the proposed technology, process, or project is innovative or replicable;
2. Degree to which the current state of the technology and the proposed advancement are clearly described;
3. Extent to which the application specifically and convincingly demonstrates how the applicant will move the state of the art to the proposed advancement;
4. Sufficiency of technical detail in the application to assess whether the proposed work is scientifically meritorious and revolutionary, including relevant data, calculations, and discussion of prior work with analyses (especially techno-economic and life cycle analysis) that support the viability of the proposed work;
5. Extent to which project has buy-in from needed stakeholders to ensure success;
6. Degree to which siting and environmental constraints are considered for deployment;
7. Extent to which project has the potential to reduce emissions and provide clean energy acceleration benefits for a community or region; and

8. Sufficiency of existing infrastructure to support addition of proposed demonstration.

Impact of Technology Advancement

1. Ability of the project to advance industry adoption;
2. Extent to which the project supports the topic area objectives and target specifications and metrics;
3. Potential impact of the project on advancing the state of the art; and
4. Extent to which the project facilitates stakeholder relationships across new or existing stakeholders to gain technical buy-in and increase potential for future deployments.

Project Management

1. Adequacy of proposed project management systems including the ability to track scope, cost, and schedule progress and changes;
2. Reasonableness of budget and spend plan as detailed in the budget justification workbook for proposed project and objectives;
3. Adequacy of contingency funding based on quality of cost estimate and identified risks;
4. Soundness of a plan to expeditiously address environmental, siting, and other regulatory requirements for the project, including evaluation of resilience to climate change; and
5. Completeness, comprehensiveness, accuracy, and strength of the application deliverables, such that DOE and independent experts will be able to identify project risk.

Criterion 2: Project Workplan, Metrics, Risks, and Market Transformation Plan (40%)

This criterion involves consideration of the following factors:

Research Approach, Workplan, and SOPO

1. Degree to which the approach and critical path have been clearly described and thoughtfully considered;
2. Degree to which the task descriptions are clear, detailed, timely, and reasonable, resulting in a high likelihood that the proposed Workplan and SOPO will succeed in meeting the project goals; and
3. Adequacy, reasonableness, and soundness of the project schedule, as well as annual Go/No-Go decisions prior to a budget period continuation application, interim milestones, and metrics to track process.

Identification of Technical Risks

1. Discussion and demonstrated understanding of the key technical risk areas involved in the proposed work and the quality of the mitigation strategies to address them.

Baseline, Metrics, and Deliverables

1. Level of clarity in the definition of the baseline, metrics, and milestones; and
2. Relative to a clearly defined project baseline, the strength of the quantifiable metrics, milestones, and mid-point deliverables defined in the application, such that meaningful interim progress will be made.

Market Transformation Plan

1. Identification of target market, competitors, and distribution channels for proposed technology along with known or perceived barriers to market penetration, including mitigation plan; and

2. Comprehensiveness of market transformation plan including but not limited to product development and testing, commercialization timeline, financing, legal/regulatory considerations including intellectual property, infrastructure requirements, etc., and product distribution.
3. Extent of industry adoption, commitments, and interest of the technology/processes.

Criterion 3: Team and Resources (20%)
This criterion involves consideration of the following factors:

1. Capability of the project manager(s) and the proposed team to address all aspects of the proposed work with a high probability of success. The qualifications, relevant expertise, and time commitment of the individuals on the team;
2. Clarity, adequacy, and completeness of roles and contributions of each team member in development of the project, including financial support of partners, and subrecipients;
3. Diversity of expertise and perspectives of the team and the inclusion of industry partners that will amplify impact;
4. Extent to which the facilities and equipment (existing and proposed) will be are sufficent to ensure project success;
5. Degree to which the proposed consortia/team demonstrates the ability to facilitate and expedite further demonstration, development, and commercial deployment of the proposed technologies;
6. Level of participation by project participants as evidenced by letter(s) of commitment and how well they are integrated into the Workplan; and
7. Reasonableness of the budget and spend plan for the proposed project and objectives.

3. Criteria for Replies to Reviewer Comments

DOE has not established separate criteria to evaluate Replies to Reviewer Comments. Instead, Replies to Reviewer Comments are attached to the original applications and evaluated as an extension of the application.

D. Other Selection Factors

1. The degree to which the proposed project exhibits technological diversity when compared to the existing DOE project portfolio and other projects selected from the subject NOFO;
2. The degree to which the proposed project, including proposed cost share, optimizes the use of available DOE funding to achieve programmatic objectives;
3. The level of industry involvement and demonstrated ability to accelerate demonstration and commercialization and overcome key market barriers;
4. The degree to which the proposed project is likely to lead to increased high-quality employment and manufacturing in the United States;
5. The degree to which the proposed project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty;
6. The degree to which the proposed project, or group of projects, represent a desired geographic distribution (considering past awards and current applications);

7. The degree to which the proposed project incorporates applicant or team members from Minority Serving Institutions; and partnerships with businesses majority owned or controlled by underrepresented persons or groups of underrepresented persons or Indian Tribes;
8. The degree to which the proposed project will employ procurement of U.S. iron, steel, manufactured products, and construction materials.
9. The degree to which the proposed project contributes to the diversity of organizations and organization types and sizes selected from the subject NOFO when compared to the existing DOE project portfolio.
10. The degree to which the proposed project avoids duplication/overlap with other publicly or privately funded work.
11. The degree to which the project's solution or strategy will maximize deployment or replication.
12. The degree to which the proposed project has broad public support from the communities most directly impacted by the project.

VII. Selection and Award Notices

Please see the NOFO Part 2, *Selection and Award Notices* for information on notifications for Concept Papers (if applicable), Applications, Award Negotiations, and Post-Selection Information Requests.

VIII. Award Administration Information

A. Post-Award Requirements and Administration

Post-Award requirements and administration applicable to awards funded under this NOFO are identified below. Detailed descriptions of standard funding restrictions are provided in the NOFO Part 2, *Post-Award Requirements and Administration* section. Detailed descriptions of program specific funding restrictions are provided below the table.

Applicable Post-Award Requirements and Administration	
Title	**Location**
Award Administrative Requirements	NOFO Part 2
Subaward and Executive Reporting	NOFO Part 2
National Policy Requirements	NOFO Part 2
Applicant Representations and Certifications	NOFO Part 2
Statement of Federal Stewardship	NOFO Part 2
Uniform Commercial Code (UCC) Financing Statements	NOFO Part 2
Interim Conflict of Interest Policy for Financial Assistance	NOFO Part 2
Whistleblower Protections	NOFO Part 2
Fraud, Waste, and Abuse	NOFO Part 2
Participants and Collaborating Organizations	NOFO Part 2
Current and Pending Support	NOFO Part 2
Prohibition Related to Malign Foreign Talent Recruitment Programs	NOFO Part 2
Foreign Collaboration Considerations	NOFO Part 2
U.S. Manufacturing Commitments	NOFO Part 2
Subject Invention Utilization Reporting	NOFO Part 2
Intellectual Property Provisions	NOFO Part 2
Go/No-Go Review	NOFO Part 2
Conference Spending	NOFO Part 2
Invoice Review and Approval	NOFO Part 2
Cost-Share Payment	NOFO Part 2

Implementation of Executive Order 13798, Promoting Free Speech and Religious Liberty	NOFO Part 2
Affirmative Action and Pay Transparency Requirements	NOFO Part 2
Construction Signage	NOFO Part 2
Real Property and Equipment	NOFO Part 1
Rights in Technical Data	NOFO Part 1

1. Real Property and Equipment

Real property and equipment purchased with project funds (federal share and recipient cost share) are subject to the requirements at 2 CFR 200.310, 200.311, 200.313, and 200.316 (non-federal entities, except for-profit entities) and 2 CFR 910.360 (for-profit entities).

For resulting awards under this NOFO, the recipients may (1) take disposition action on the real property and equipment; or (2) continue to use the real property and equipment after the conclusion of the award period of performance with Grants Officer approval. The recipient's written request for Continued Use must identify the property and include: a summary of how the property will be used (must align with the authorized project purposes); a proposed use period, (e.g., perpetuity, until fully depreciated, or a calendar date when the recipient expects to submit disposition instructions); acknowledgement that the recipient shall not sell or encumber the property or permit any encumbrance without prior written DOE approval; current fair market value of the property; and an estimated useful life or depreciation schedule for equipment.

When the property is no longer needed for authorized project purposes, the recipient must request disposition instructions from DOE. For-profit entity disposition requirements are set forth in 2 CFR 910.360. Property disposition requirements for other non-federal entities are set forth in 2 CFR 200.310 – 200.316.

2. Rights in Technical Data

Data rights differ based on whether data is first produced under an award or instead was developed at private expense outside the award.

"Limited Rights Data": The U.S. government will not normally require delivery of confidential or trade-secret-type technical data developed solely at private expense prior to issuance of an award, except as necessary to monitor technical progress and evaluate the potential of proposed technologies to reach specific technical and cost metrics.

Government Rights in Technical Data Produced Under Awards: The U.S. government normally retains unlimited rights in technical data produced under government financial assistance awards, including the right to distribute to the public. However, pursuant to special statutory authority, certain categories of data generated under DOE awards under this NOFO may be protected from public disclosure for up to five years after the data is generated ("Protected Data"). For awards permitting Protected Data, the protected data must be marked as set forth in the award's intellectual property terms and conditions and a listing of unlimited rights data (i.e., non-protected data) must be inserted into the data clause in the award. In addition, invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application.

3. Cost Share Payment

DOE requires recipients to contribute the cost share amount incrementally over the life of the award. Specifically, the recipient's cost share for each **billing period** must always reflect the overall cost share ratio negotiated by the parties (i.e., the total amount of cost sharing on each invoice when considered cumulatively with previous invoices must reflect, at a minimum, the cost sharing percentage negotiated).

B. Helpful Websites

Office of Energy Efficiency & Renewable Energy | Department of Energy EERE Application Process

C. Questions and Support

1. Questions

Upon the issuance of a NOFO, DOE personnel are prohibited from communicating (in writing or otherwise) with applicants regarding the NOFO except through the established question and answer process described below. Questions regarding this NOFO must be submitted to mailto: sparcnofo@hq.doe.gov no later than three (3) business days prior to the application due date and time. Please note, feedback on individual concepts will not be provided through Q&A.

All questions and answers related to this NOFO will be posted on the eXCHANGE site listed in the Key Facts section above. **You must first select the NOFO Number to view the questions and answers specific to this NOFO**. DOE will attempt to respond to a question within three (3) business days unless a similar question and answer has already been posted on the website.

Questions related to the registration process and use of the eXCHANGE site listed in the Key Facts. should be submitted to *EERE-ExchangeSupport@hq.doe.gov* .

2. Support

Grants.gov

support@grants.gov

SAM.gov

Federal Service Desk

IX. Other Information

Please see the NOFO Part 2, *Other Information* for additional information and requirements that apply to all DOE NOFOs.

APPENDIX A – ACCEPTABLE FEEDSTOCKS

The Bioenergy Technologies Office works with biomass-based feedstocks, per the authorizing language in EPAct 2005 (see below). Each Subtopic Area in this NOFO has specific feedstock requirements which are identified in the Table below. **Applications proposing the use of any feedstock not identified as an acceptable feedstock for the particular Topic Area will not be further considered.**

Topic Area	Acceptable Feedstock Breakdown per Subtopic Area										
	Ligno-cellulosic	**Algae**	**Organic Wet Waste**	**Sorted MSW**	**Food Waste**	**Biogas**	**Grain Starch**	**Oilseed Crops**	**C&D Waste**	**Waste Carbon Dioxide**	**Carbon Dioxide from Ambient Air**
Topic Area 1	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes, if bio-based	No
Topic Area 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No

Feedstock Definitions:

"Biomass" is defined generally in the authorizing language of EPAct 2005, §932 (reproduced below). More specifically for the purposes of this NOFO, biomass includes agricultural residues, forest resources, perennial grasses, woody energy crops, algae, organic wet waste (e.g., biosolids), sorted municipal solid waste, food waste, and biogas.

"Lignocellulosic Feedstocks" are defined generally in the authorizing language of EPAct 2005, §932 (reproduced below). More specifically for the purposes of this NOFO, are defined as any portion of a plant or coproduct from conversion, including crops, trees, forest residues, and agricultural residues not specifically grown for food, [emphasis added] including from barley grain, grape seed, rice bran, rice hulls, rice straw, soybean matter, and sugarcane bagasse.

"Algae" for the purpose of this NOFO, as included in the definition of "biomass" above is defined as eukaryotic microalgae, macroalgae (seaweed), and cyanobacteria.

"Organic Wet Waste" for the purpose of this NOFO, "wet waste" refers to the following: primary, secondary, tertiary, and post-anaerobic digestion sludge (i.e., biosolids) from municipal wastewater treatment systems; food wastes from industrial, commercial, and residential sources; organic-rich wastewaters from industrial and commercial operations; manure slurries from animal husbandry operations.

"Sorted Municipal Solid Waste" for the for the purposes of this NOFO, is defined as the organic and plastic constituents of the MSW stream going to the landfill (typically known as municipal garbage). See chapter 2 in the Resource Conservation and Recovery Act Orientation Manual 2014 - https://www.epa.gov/sites/production/files/2015-07/documents/rom.pdf

"Food Waste" for the purposes of this NOFO, is defined as food from industrial, commercial, and residential sources that is no longer suitable for human consumption which would have otherwise entered an anaerobic digester, landfill or other post consumer disposition.

"Biogas" for the purpose of this NOFO, refers to the mixture of gases produced by the breakdown of organic matter in the absence of oxygen, primarily consisting of methane and carbon dioxide.

"Grain Starch" for the purposes of this NOFO, refers to commercially available starch derived yellow dent feed corn, wheat and grain sorghum/milo. Please note that Greenhouse Gas reductions of at least 70% must be met if utilizing grain starch.

"Oilseed Crops" for the purposes of this NOFO, refers to US-produced, oil producing crops including, but not limited to soybeans, cottonseed, sunflower seed, canola, rapeseed, peanuts, camelina, carinata, pennycress, and oil producing annual cover crops[11][12]. Please note that Greenhouse Gas reductions of at least 70% must be met if utilizing an oil seed crop(s).

"Construction and Demolition Waste" or "C&D Waste" for the purposes of this NOFO, refers to a type of waste that is not included in municipal solid waste (MSW). Materials included in the C&D debris generation estimates are steel, wood products, drywall and plaster, brick and clay tile, asphalt shingles, concrete, and asphalt concrete. These materials are used in buildings, roads and bridges, and other sectors.

"Waste Carbon Dioxide" for the purpose of this NOFO, refers to any waste carbon dioxide (CO_2) produced as a byproduct from fermentation or the combustion of biomass or other biopower processes.

"Carbon Dioxide by Direct Air Capture" for the purposes of this NOFO, refers to carbon dioxide (CO_2) from the ambient air, which has been either captured in Direct Air Capture (DAC) machines and delivered to algal systems or captured through chemically, biologically, or mechanically assisted accelerated diffusion of air into algal system growth media.

EPAct 2005, §932, codified at 42 U.S.C. § 16232. BIOENERGY PROGRAM.

(a) DEFINITIONS:—In this section:

(1) BIOMASS.—The term "biomass" means—

(A) any organic material grown for the purpose of being converted to energy;

(B) any organic byproduct of agriculture (including wastes from food production and processing) that can be converted into energy; or

(C) any waste material that can be converted to energy, is segregated from other waste materials, and is derived from—

(i) any of the following forest-related resources: mill residues, precommercial thinnings, slash, brush, or otherwise non-merchantable material; or

[11] https://www.ers.usda.gov/topics/crops/soybeans-oil-crops/oil-crops-sector-at-a-glance/#:~:text=The%20major%20U.S.%20oilseed%20crops,percent%20of%20U.S.%20oilseed%20production.&text=Field%20Crops%20for%20soybean%20dates%20by%20region).

[12] https://www.epa.gov/renewable-fuel-standard-program/approved-pathways-renewable-fuel

(ii) wood waste materials, including waste pallets, crates, dunnage, manufacturing and construction wood wastes (other than pressure-treated, chemically-treated, or painted wood wastes), and landscape or right-of-way tree trimmings, but not including municipal solid waste, gas derived from the biodegradation of municipal solid waste or paper that is commonly recycled.

(2) LIGNOCELLULOSIC FEEDSTOCK.—The term "lignocellulosic feedstock" means any portion of a plant or coproduct from conversion, including crops, trees, forest residues, and agricultural residues not specifically grown for food, [emphasis added] including from barley grain, grape seed, rice bran, rice hulls, rice straw, soybean matter, and sugarcane bagasse.

(b) PROGRAM.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for bioenergy, including—

(1) biopower energy systems;
(2) biofuels;
(3) bioproducts;
(4) integrated biorefineries that may produce biopower, biofuels, and bioproducts;
(5) cross-cutting research and development in feedstocks; and
(6) economic analysis

(c) BIOFUELS AND BIOPRODUCTS.—The goals of the biofuels and bioproducts programs shall be to develop, in partnership with industry and institutions of higher education—

(1) advanced biochemical and thermochemical conversion technologies capable of making fuels from lignocellulosic feedstocks that are price-competitive with gasoline or diesel in either internal combustion engines or fuel cell-powered vehicles;
(2) advanced biotechnology processes capable of making biofuels and bioproducts with emphasis on development of biorefinery technologies using enzyme-based processing systems;
(3) advanced biotechnology processes capable of increasing energy production from lignocellulosic feedstocks, with emphasis on reducing the dependence of industry on fossil fuels in manufacturing facilities; and
(4) other advanced processes that will enable the development of cost-effective bioproducts, including biofuels.

APPENDIX B – VERIFICATIONS

All applications selected for award negotiations under this NOFO are required to participate in a verification process led by DOE's identified external third-party non-conflicted verification team. This team may be led by the National Renewable Energy Laboratory's Systems Integration team, BETO's independent engineering contractor, or another non-conflicted BETO contractor. Personnel involved in verifications sign project specific Non-Disclosure Agreements and conflict of interest statements. This verification process provides technical assistance to both BETO and the project by providing an in-depth analysis of key technical and economic metrics to ensure transparency and increase the likelihood of project success.

The objectives of the verification effort are to:

- Verify the applicant's technical data/performance metrics/targets as described in the original application.
- Establish a framework to evaluate and track progress over time so that the milestones and Go/No-Go decision points separating budget periods may be tracked and evaluated.
- Establish benchmark, baseline, and associated target values.
- Identify potential major showstoppers and discuss risk mitigation strategies.
- Align project goals with BETO's expectations.

There are three types of verification periods throughout the lifetime of the project: the "Initial Verification," conducted at the beginning of the project (months 0-3); the "Intermediate Verification(s)," conducted as a part of Go/No-Go decisions separating budget periods; and the "Final Verification," conducted at the end of the project (within 3 months of closeout). The verification team will perform some or all of these verifications at the recipient's facility to initially verify the data included in the application and subsequently in conjunction with site visits to monitor progress.

The specific objectives of these verifications are set forth below:

Verification Timeline:

The initial verification period, including on-site observation of experiments (if applicable) and report creation, can take up to three months. Applicants must include this time in their schedule. Selected projects that receive a 'Go' decision at the conclusion of the initial verification effort will be subject to both an intermediate and a final verification. The time required for the intermediate and final verifications will be considerably less than the initial verification. However, the applicant must also consider that time should be allocated to collect and analyze data for these verifications. The interim verification must be complete prior to moving between budget periods (i.e. the end of a budget period should be after any necessary key milestone delivery dates).

Verification Task:

All applicants must include the initial verification task within their scope as Task 1. It must be separated from the rest of the scope of work by a Go/No-Go decision point, and applicants should estimate a three-month duration for the verification effort. This task, Task 1, will also be within a separate budget period, Budget Period 1 (BP1), from the remainder of the project. By way of example, the inclusion of the verification in the scope could include something like the following:

There will be a Go/No-Go associated with Task 1.1 as follows: Process information and data supporting the technology readiness level of the overall process, the unit operations within the process, and the original application. Technical metrics are based on preliminary data and represent a meaningful baseline and set of targets.

Upon successful completion of the initial verification effort and Go/No-Go decision point, the project will commence with work on the Priority Areas as discussed.

Similar provisions must be included for the Intermediate Verification as a task that will occur mid-way through the project (e.g., at 18 months) and the final verification that will occur at the end of the project (within 3 months of completion, e.g at 35 months).

Verification Conflict of Interest/Proprietary Information:

All the technical and economic information requested will be disclosed to non-conflicted DOE National Renewable Energy Laboratory Systems Integration (NREL-SI) personnel and/or external third-party non-conflicted validators performing the verifications (BETO's verification team) as well as non-conflicted

third-party reviewers potentially participating in the Go/No-Go review process and/or interim review meetings. It is expected that developments and advancements in technical performance made during the course of the project will be shared with the public via technical publications in journals or conference proceedings. It is also anticipated the initial verification may, if necessary, involve pre-existing intellectual property of which DOE will not require publication. Data access, deliverables and dissemination requirements will be negotiated and set forth in the Statement of Project Objectives and will be consistent with Section VIII.M. of this NOFO. DOE and those working on DOE's behalf, such as support service contractors, NREL personnel, Independent Engineers, validators, and reviewers, must be able to have sufficient access to these data, including but not limited to raw technical and financial data, to assess the baseline performance of the technology – subject to appropriate non-disclosure agreements or other protections.

Verification Process:

The verification effort generally includes three steps: pre-verification, on-site verification (when applicable), and post-verification. The verification effort will be adapted to be appropriate for the technology readiness level and funding available to the project. However, the details provided below establish the framework for the process.

All steps are performed in concert with BETO's verification team and the project management team. During the pre-verification step, the verification team will work closely with the project team to discuss the effort in detail, initiate the review of the data from the Performance Data Table and metrics as provided in the original application, and set the date for the on-site meeting. This is an iterative process between the two teams and establishes the agenda for the on-site meeting. During the on-site verification meeting, the two teams will work together to discuss the goals and performance metrics, ideas for tracking project progress, and alignment with BETO's goals. At the conclusion of the on-site meeting, both teams will have the information needed to proceed forward. The post-verification step includes the verification team reporting to DOE and the DOE personnel working through the Go/No-Go decision point.

At the conclusion of the verification effort and once a Go/No-Go decision has been made, the DOE Technology Manager and Contracting Officer will send a formal document to the recipient regarding the Go/No-Go decision and activities will proceed from there (based on the decision). If a 'Go' decision is reached, the project team and DOE Technology Manager will proceed with the necessary steps to release the remaining scope and associated funding for the project. A 'No-Go' decision may result in termination of the project or re-direction of scope.

Key Verification Requirements:
During the initial verification effort (i.e., BP1), no additional experimental or project work, beyond that associated with the verification, may commence within the proposed scope. Only work associated with the initial verification – typically project management and data gathering activities – is allowed during the initial verification. The budget associated with the initial verification effort should correspond only to these types of activities and is typically minimal compared to the remaining project scope and budget. It is anticipated that the intermediate and final verifications will include the recipient presenting the project progress toward the targets established during the initial verification. Both the intermediate and final verifications must be noted and accounted for within the scope, schedule, and budget, so that if a project is selected and receives a 'Go' decision at the conclusion of the initial verification effort, the schedule and budget will already account for the intermediate and final verifications.