

QUESTIONS AND ANSWERS

PLEASE REFER TO THE GENERAL FAQs SECTION OF ARPA-E'S WEBSITE ([HTTP://ARPA-E.ENERGY.GOV/?Q=FAQ/GENERAL-QUESTIONS](http://arpa-e.energy.gov/?q=faq/general-questions)) FOR ANSWERS TO MANY GENERAL QUESTIONS ABOUT ARPA-E AND ARPA-E'S FUNDING OPPORTUNITY ANNOUNCEMENTS. ADDITIONAL QUESTIONS SPECIFIC TO THIS FOA ONLY ARE INCLUDED BELOW. PLEASE REVIEW ALL EXISTING GENERAL FAQs AND FOA-SPECIFIC QUESTIONS BEFORE SUBMITTING NEW QUESTIONS TO ARPA-E.

I. Concept Paper Phase Questions:

Q1. *REDACTED*** I WOULD LIKE TO INQUIRE WHETHER YOU WOULD ALSO CONSIDER, BIOLOGICAL APPROACHES ASIDE, NOVEL NITROGEN FERTILIZER MATERIALS THAT RELY ON CRYSTAL DESIGN OR COCRYSTALIZATION SUCH AS IN MY RECENT WORK. ***REDACTED*** I WAS WONDERING IF OUR METHODS WOULD FIT UNDER CATEGORY D OF THE PROGRAM OR IF IT IS STRICTLY RESERVED FOR BIOLOGICAL APPROACHES.**

ANSWER: Alternative strategies for fertilizer delivery that have elements of microbial and/or plant biodesign will be considered as part of proposed projects, as described in Category D in Section I.D of the FOA.

Q2. I HAVE A CONFLICT OF INTEREST WITH THE PROGRAM DIRECTOR OF TEOSYNTE *REDACTED***, AS HE WAS MY POSTDOC SUPERVISOR. HOWEVER, I WOULD LIKE TO APPLY FOR THIS FUNDING OPPORTUNITY. AM I ALLOWED TO APPLY? IF NOT, IS THERE ANY WORKAROUND, SUCH AS LETTING ANOTHER PERSON BE THE MAIN PI ON THE PROJECT?**

ANSWER: There are no restrictions on submitting proposals for a FOA based on the conflicts with a particular program director at ARPA-E. Conflicts are managed by ARPA-E during the proposal evaluation process.

Q3. WHEN WE PUT TOGETHER WHAT OUR GROUPS WOULD REQUIRE FOR A REALLY WELL INTEGRATED LAB AND FIELD PROJECT TO ADDRESS THE PRIORITY AREA WE REALIZED THAT BUDGET WOULD BE BETWEEN \$9-10 MILLION. WOULD IT BE MORE COHERENT AND COMPETITIVE TO SUBMIT A SINGLE MERGED PROPOSAL OR TWO SEPARATE (AND INDEPENDENT) PROPOSALS?

ANSWER: The cover page of the FOA states that awards may vary from \$1-10 million. Section II.A of the FOA states that "ARPA-E expects to make approximately \$36 million available for new awards, subject to the availability of appropriated funds. ARPA-E anticipates making approximately 7-9 awards under FOAs DE-FOA-0003405 and DE-FOA-0003408." All proposals that are compliant and responsive according to the parameters set out in the FOA will be considered.

Q4. ARE OTHER BIO ENERGY CROPS THAT HAVE PATHWAYS TO ETHANOL OF INTEREST FOR THIS FOA, AND COULD BE CONSIDERED IN SCOPE BEYOND CORN OR SORGHUM?

ANSWER: Corn and sorghum are the two crops considered in this FOA. Section I.C of the FOA states that “ARPA-E seeks proposals that address and develop technologies that can lead to a 50% reduction in N₂O emissions by 2030 compared to the 2005 emissions baseline as targeted by the Biden Administration in 2021. These technologies will require a minimum reduction of N fertilizer inputs by more than 48% in corn and sorghum cultivation without compromising yield.” The FOA is seeking technologies to reach these quantitative metrics. Any proposals that are compliant and responsive to the criteria described in Section III.C of the FOA will be considered.

Q5. WE ARE PREPARING A CONCEPT PAPER FOR THE TEOSYNTE FUNDING CALL AND WANTED TO ASK WHETHER OUR PROJECT FALLS WITHIN THE INTENDED SCOPE OF THE PROGRAM.

A MAJOR BARRIER TO PRACTICAL NITROUS OXIDE EMISSION MITIGATION IS A LACK OF KNOWLEDGE ABOUT THE CONDITIONS THAT CAUSE RHIZOSPHERE MICROBES TO PRODUCE OR DEGRADE NITROUS OXIDE. THESE CONDITIONS ARE DIFFICULT TO STUDY DUE TO THE CURRENT INABILITY TO CONTINUOUSLY AND NONDESTRUCTIVELY MEASURE THE EXPRESSION DYNAMICS OF KEY GENES INVOLVED IN MICROBIAL NITROGEN METABOLISM OVER THE LARGE SPATIOTEMPORAL SCALES RELEVANT TO AGRICULTURE.

TO ADDRESS THIS NEED, WE PROPOSE TO *REDACTED***.**

- 1. DO YOU FEEL THAT THIS PROJECT, WHICH WOULD CREATE A PLATFORM THAT ENABLES THE COLLECTION OF INFORMATION THAT CAN INFORM STRATEGIES FOR REDUCING NITROUS OXIDE EMISSION, FITS WITHIN THE SCOPE OF THE TEOSYNTE PROGRAM?**
- 2. IS THE DEVELOPMENT OF SENTINEL PLANTS IN MODEL RESEARCH PLANT SPECIES RESPONSIVE TO THIS CALL, OR IS IT REQUIRED TO WORK IN CORN OR SORGHUM?**

ANSWER: Please see the response to Q4 above.

Q6. I AM AN ASSISTANT PROFESSOR AT *REDACTED*** UNIVERSITY; WE HAVE A TEAM ***REDACTED*** WITH A FOCUS ON N2O EMISSIONS IN THE US CORN BELT ZONE.**

WE WOULD LIKE TO CHECK IF THIS CALL CONSIDERS A PROPOSAL RELATED TO OPTIMIZING NITROGEN USE EFFICIENCY AND REDUCING N2O EMISSION: INTEGRATING MANAGEMENT PRACTICES, SOIL MICROBIOME ANALYSIS, AND MODELING APPROACHES IN THE US CORN BELT ZONE.

IT SEEMS TO FIT CATEGORY D, BUT WE DO NOT HAVE GENOMIC MODIFICATION OF PLANTS AND MICROBES BUT HAVE THE COMPONENT OF INTERACTIONS BETWEEN CROP AND MICROBE IN THE SOIL.

BELOW ARE THE OBJECTIVES:

- (1) QUANTIFY CROP NITROGEN USE EFFICIENCY (NUE), CROP YIELD AND MONITOR FIELD N2O EMISSION;**
- (2) CHARACTERIZE THE DOMINANT MICROBIAL PROCESSES INFLUENCING CROP NUE AND N2O EMISSIONS AND**
- (3) IDENTIFY THE BEST PRACTICES FOR OPTIMIZING NUE WITH THE OVER 50% REDUCTION IN N2O EMISSIONS THROUGH MACHINE LEARNING-BASED MODELING IN THE CORN BELT REGION.**

ANSWER: As stated in Section I.D of the FOA, all projects, including those in Category D, must have an element of microbial and/or plant biodesign. Plant biodesign can include selection of cultivars by breeding.

Q7. ON BEHALF OF OUR TEAM, I HAVE SEVERAL QUESTIONS THAT SHOULD HELP US IN PREPARING OUR CONCEPT PAPER. ANSWERS CAN BE WRITTEN OR IF YOU PREFER WE CAN ARRANGE A ZOOM CHAT.

WE HAVE QUESTION CONCERNING THE TECHNOLOGIES TO MARKET QUERIES. HOW CENTRAL IS THE PACKAGED TECHNOLOGY FOR PRODUCT DEPLOYMENT COMPONENT FOR A PROOF-OF-CONCEPT R&D PROPOSAL?

IN TERMS OF DELIVERABLES, HOW FAR DO WE NEED TO GO BEYOND FIELD-LEVEL PROOF-OF-CONCEPT OF A TECHNOLOGY? FOR EXAMPLE, WOULD ESTABLISHING AN INDUSTRIAL PARTNERSHIP BE SUFFICIENT OR DOES IT REQUIRE INVOLVEMENT OF AN INDUSTRY PARTNER IN DEPLOYING A PRODUCT IN BROADER FIELD-BASE EFFICACY ASSESSMENTS DURING THE FUNDING PERIOD?

HOW DO THE EXPECTATIONS OF DELIVERABLES DIFFER BETWEEN A PROOF-OF-CONCEPT R&D PROJECT AND ONE WHERE THE TECHNOLOGY IS ALREADY POISED FOR EXECUTION OF A COMMERCIALIZATION PLAN?

ANSWER:

1. This question relates to possible paths to market for the technology developed in this FOA. The technology does not have to be market-ready at the end of the period of performance, but a path to market should be defined by the end of the project.
2. A field proof-of-concept is sufficient to satisfy the requirements of the FOA.
3. The deliverables of each individual project will depend on the technology readiness level at the beginning of the period of performance.

Q8. I HAVE A FEW QUESTIONS.

(1) FOR APPROACHES ARPA-E CATEGORIZES AS BIO-DESIGN, WHAT ARE EXAMPLES OF ACTIVITIES CONSIDERED IN SCOPE VERSUS OUT OF SCOPE? (THE FOA STATES BIO-DESIGN MAY INCLUDE GENETIC MODIFICATION OF PLANTS AND MICROBES BUT DOES NOT SPECIFICALLY DEFINE BIO-DESIGN)

(2) IS THE ENGINEERING OF NITROGEN-FIXING MICROBES TO EFFICIENTLY UTILIZE LOW-COST FEEDSTOCKS TO REDUCE PRODUCTION COSTS WITHIN SCOPE OF THE PROGRAM?

ANSWER:1. Biodesign for this FOA is broadly defined as altering the genome of a plant or microbe. The methods to achieve this alteration can be targeted or random. As noted in Section I.D of the FOA, for Category D, microbial or plant biodesign can be combined with other technologies to achieve the reduction in N fertilizer and N₂O emissions.

2. Yes, this approach is within the scope of the requirement for microbial biodesign.

Q9. I HAVE A NUMBER OF QUESTIONS REGARDING PROGRAM ADMINISTRATION AND REQUIREMENTS

- 1. DO THE TWO YEARS OF FIELD TRIALS HAVE TO BE ON THE EXACT SAME PRODUCT/STRAIN/APPROACH? OR COULD YOU STRUCTURE THE PROPOSED WORK TO HAVE ONE YEAR OF DEVELOPMENT, ONE YEAR OF FIELD TESTING, AND THEN A SUBSEQUENT YEAR OF IMPROVEMENT AND FIELD TESTING? EVEN IF WE NEED TO HAVE TWO YEARS OF FIELD TESTING ON THE SAME PRODUCT COULD WE INCLUDE ADDITIONAL IMPROVEMENTS OR OTHER ALTERNATIVES IN THE SECOND YEAR (E.G. TEST THE INITIAL PROTOTYPE ALONG WITH OTHER IMPROVED VERSIONS).**
- 2. FOR THE SBIR FOA, IF A TEAM IS PROPOSING A FULL PHASE I/II/IIS SCOPE OF WORK ARE THERE LIMIT ON THE PROGRAM BUDGET PER THE TRADITIONAL PHASE I/II SBIR GUIDELINES? FOR EXAMPLE, WOULD WE BE LIMITED TO ONLY \$306,872 IN THE FIRST 6 MONTHS (THE SHORTEST PHASE I DURATION IN STANDARD SBIRS).**
- 3. CAN A PROJECT ADDRESS N₂O EMISSIONS FROM BOTH THE PERSPECTIVE OF FERTILIZER DISPLACEMENT AND DENITRIFICATION INHIBITION IN A COMBINED APPROACH, OR WOULD THOSE BE CONSIDERED "UNRELATED CONCEPTS AND TECHNOLOGIES"?**

ANSWER: 1. The two years of field testing do not need to be identical. They may include different panels in the two years depending on initial lab and field results and the second year may be at a different scale than the first.

2. The SBIR funding limits are as follows: Phase I award (including modifications) up to \$306,872 and Phase II award (including modifications) up to \$2,045,816.

3. Addressing N₂O emissions through fertilizer displacement and denitrification inhibition may be combined in a single approach.

Q10. WE ARE CURRENTLY WORKING ON OUR CONCEPT PAPER AND HAVE A QUESTION REGARDING THE PAGE LIMITATION. SPECIFICALLY, WE NEED CLARIFICATION ON WHETHER THE REFERENCES CITED WILL BE COUNTED TOWARDS THE FIVE-PAGE LIMITATION.

ANSWER: Yes. Please refer to ARPA-E website FAQ page General Questions 6.21.

Q11. I NOTICED THAT YOU HAVE SUGGESTED A COUPLE OF TABLES OF QUESTIONS IN THE CONCEPT PAPER TEMPLATE . I AM WONDERING WHETHER THESE TABLES OF QUESTIONS (INCLUDING OUR ANSWERS) WOULD COUNT TOWARDS THE FIVE-PAGE LIMITATION AS WELL. THANKS FOR CLARIFYING.

ANSWER: Yes, the tables will count toward the 5 page limit.