



DE-FOA-0002250 - SMARTFARM

Questions can be sent to ARPA-E-CO@hq.doe.gov

FIRST DEADLINE FOR QUESTIONS TO ARPA-E-CO@HQ.DOE.GOV:

5 PM ET, FRIDAY, FEBRUARY 7, 2020

SECOND DEADLINE FOR QUESTIONS TO ARPA-E-CO@HQ.DOE.GOV:

5 PM ET FRIDAY, JUNE 12, 2020

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:

Q1.1 [W]e have two questions regarding the availability of data from Phase 1 of the program. Since phase 1 will start roughly one year ahead of phase 2, would it be reasonable to assume phase 2 performers will have access to preliminary field data by the beginning of phase 2, and the first full-season data by half year into phase 2 (mid 2021)?

ANSWER: While ARPA-E cannot guarantee the exact timing of data availability and its alignment with negotiating and executing Phase 2 awards, the intention is to make the Phase 1 data available to Phase 2 performers as soon as possible.

Q1.2 Are there any new types of data have been incorporated into phase 1 that are proposed by the selected performers but not listed in the phase 1 solicitation? We are particularly interested in the soil nitrogen in the form of nitrate(NO₃⁻) and ammonium (NH₄⁺) measured at regular frequencies with certain space resolution during the growing season.

ANSWER: This information cannot be shared at this time as the Phase 1 awards are still being negotiated. However, we intend to make as much data collected from Phase I sites publically available as soon as possible.

Q2. My company seeks to document the impact of the Biofuel - Biogas derived from US Dairy Farm Agricultural Waste Resources and Management. This is not specifically referenced in the above FOA-0002250 or DE-FOA-0002251 (SBIR / STTR), however in readings the concept paper requirements due for submission on February 19, 2020 it fits perfectly with our project scope of work. The question is simply this: "Does either DE-FOA-002250 or DE-FOA-0002251 (SBIR / STTR) FOA apply to quantifying feedstock production and lifecycle emissions from BIOGAS as an agriculturally derived biofuel for a qualified US company to apply for with in the rules and criteria for this application?"

ANSWER: Please refer to Technical Requirements sections of the DE-FOA-002250 (Section I.D. and I.E.) or DE-FOA-0002251 (SBIR / STTR, Section I.E. and I.F.) FOAs. Technologies capable of meeting the specifications under these sections will be considered.

Q3. [We are] seeking clarification regarding the language on Page 35 in [FOA] Section [IV.C.1.c] "Operational Plan and System Cost" This is a requirement for the Concept Paper, and the third bullet point is as follows:

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How much the system is expected to cost at commercial scale on a \$/acre/year basis, broken down by hardware & software components, deployment/labor assumptions, and O&M costs.

[W]e would like to know if the budget you are requesting for “how much the system is expected to cost at a commercial scale” is referring to:

1. funding that DOE would provide to the [recipient] (the project budget), OR
2. if this is an estimate of the costs that the PIs of the proposal believe it will require for the DOE to spend to commercialize the technology developed as a result of receiving this award.

ANSWER: The request is to estimate the cost of the proposed system at commercial scale (e.g. *nth* of a kind), not the project budget, DOE funding requirement, or anticipated cost of achieving commercial scale. The expectation is that applicants will form these budget estimates in the context of the information requested in Section IV.C.1.c: Operational Plan and System Cost, and that commercial costs will comprise the hardware, software and labor required to achieve the technical targets. It is understood that these estimates will be based on assumptions regarding the cost of hardware components, and the labor and analytics required to achieve the technical targets specified in Technical Requirements sections of the DE-FOA-002250 or DE-FOA-0002251 (SBIR / STTR) FOA.

Q4. Are the awardees who receive the SMARTFARM phase 1 funding eligible for applying to the phase 2 FOA call?

ANSWER: Yes.

Q5. We are developing an concept paper to the SMARTFARM program with a total of two experiment sites in two US states (i.e. one site in each state). The SMARTFARM FOA requires an experiment scale of ≥ 80 acres. Does this mean each experiment site have to have at least 80 acres of experiment fields or the total acreage from all experiment sites need to be ≥ 80 acres?

ANSWER: The scale specification in Technical Requirements sections of the DE-FOA-002250 or DE-FOA-0002251 (SBIR / STTR) FOA do not refer to the development of experimental sites; rather, it refers to the scale of operation assuming technical success of the proposed technology. For example, a system capable of achieving the cost and uncertainty targets at < 80 acres, but would not be capable of meeting the cost or uncertainty targets at the > 80 acre scale, falls outside the technical parameters specified in this FOA.

Q6. It has been several weeks since the deadline for concept papers for the SMARTFARM FOA (DE-FOA-0002250/DE-FOA-0002251), will a solicitation for Full Applications be released? If so, when?

ANSWER: Yes, a solicitation for full applications is forthcoming. In light of the current circumstances, ARPA-E has decided to open the solicitation for full-applications to all potential applicants, including those that did not submit a compliant and responsive Concept Paper. In short, **the funding opportunity announcement will be modified to reflect that submission of a compliant and**

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responsive Concept Paper is not required to submit a Full Application. ARPA-E expects to issue a Full Application FOA Modification in mid-late April. The deadline for Full Applications is expected to be mid-June.

Q7. I submitted a Concept Paper to the initial SMARTFARM FOA (DE-FOA-0002250/DE-FOA-0002251), will I be receiving feedback on my proposal?

ANSWER: Applicants providing compliant and responsive Concept Papers prior to the Concept Paper deadline will have their papers evaluated and will be receiving feedback upon the release of the Full Application FOA Modification.

II. Full Application Phase Questions:

Q8. In the technical performance targets it lists an RMSE of < 30 kg C per acre. From my calculations this is much higher precision than even the gold-standard dry combustion method currently used. For example, a dry combustion uncertainty of 0.1% translates to an uncertainty of around 1330 kg C per acre. Is the target of the program really to achieve a 40x improvement over the state of the art, or is there an error in the calculations somewhere (possibly in mine!)?

ANSWER: This metric has been modified in the Full Application FOA. Please refer to Section I.E., *Technical Performance Targets*, for the revised metrics.

Q9. This is Jin, research scientist of N5 Sensors. We are planning to write research proposal for applying SMARTFARM SBIR program and have a question. The program has two categories 1) N2O detection and 2) soil carbon estimation. At this point, I have a quick question. Should applicant propose the research performing both categories? Because we have extensive specialty on gas detection, we'd like to focus on only N2O detection. If we should, we need to find research partner for involving soil estimation.

ANSWER: A single submission may address only one category, or both categories, so long as a single system is being proposed to address one or both categories. If two separate systems are to be developed, one for each category, two applications should be submitted.

Q10.1 I am inquiring on a budget question for funding opportunity DE-FOA-0002250, is it ok to change/increase our budget amount, from what was submitted in the concept paper? Or does ARPA-e require staying within the budget amount used in the concept paper?

ANSWER: Applicants can update the proposed budget in the Full Application phase of the submission process.

Q10.2 Also where should equipment quotes be uploaded for the proposal?

ANSWER: Applicants can append quotations to the SF-424A Workbook using the INSERT → Object function of MS Excel.

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CORRECTION (12-Jun-2020): ARPA-E has added an interface to eXCHANGE that permits applicants to separately upload supporting budget documentation.

Q11. We are planning to submit a SMARTFARM proposal as a team consisting exclusively of domestic educational institutions, a federal agency (GOGO) and a small business. This combination is not discussed specifically, but the FOA would seem to imply that the cost share requirement would be 10%. Can you confirm this or identify the appropriate cost share?

ANSWER: For purposes of determining project cost-sharing requirements, non-DOE Government-owned, Government-operated laboratories are afforded the same treatment as DOE laboratories/Federally Funded Research and Development Centers (FFRDCs).

Q12. One of the slides on your April 28 Webinar on SMARTFARM has specific requirements on 'Analytics:

- No central hub
- ML (machine leaning) without full datasets

Q12.1 Can you clarify on 'no central hub'? Do you mean no centralized computer server(s) for multiscale data, image processing, machine learning, simulation modeling, or [do] you mean something else?

ANSWER: This is one of several examples of technical challenges related to digital agriculture featured in the webinar; it is not explicitly addressed in the FOA.

Q12.2 Can you also clarify on 'machine leaning without full datasets?

ANSWER: This is one of several examples of technical challenges related to digital agriculture featured in the webinar; it is not explicitly addressed in the FOA.

Q13.1 The system-level uncertainty seems to have changed dramatically from version 1 to version 2. From 0.08% (assuming 40 t of C per acre) to 15%. I would like to clarify that the quoted number is really on the total carbon and not on the change of carbon per year. E.g. assuming 40e3 kg of Carbon in one acre, the instrument has to measure the total carbon in the range of 40e3+-6000 kg (with the error given as root mean square). Or are the 15% meant to be an error on the measured yearly change in carbon (which would bring it closer to 30 kg again). It would be great to provide some numbers here as an example to remove any ambiguity.

ANSWER: The system-level uncertainty metric should apply to the absolute measurement of total soil carbon. Applications proposing Phase 2 tools that would attempt to measure the change directly should include error propagation to demonstrate arrival at a total carbon measurement uncertainty of 15%.

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Q13.2 What is the definition of system level variation? It doesn't seem to be clearly defined in the text. I assume the system-level uncertainty is the RMSE error of repeated measurements on the same single acre compared to the real total carbon value and that the system-level variation comes from the fact that the FOA wants the system to estimate total carbon across many acres (≥ 80). These 80 acres will have a mean (or total sum) and a standard variation from the natural distribution of total carbon values. Does the requirement for the system-level variation apply to the estimate of the mean, e.g. the mean across 80 acres needs to be estimated within 20% (assuming every acre would have 40t, that would mean $\leq 40t \cdot 80 \cdot 20\% = 640t$) or does the system need to estimate the mean and the sigma (each within 20% of the true value) or just the sigma (the variation)? Again, some simple example that provides some numbers would be great.

ANSWER: The system-level uncertainty is based on the repeated measurements on the same single acre compared to the real total carbon value of the same single acre. The requirement for the system-level variation applies to the estimate of the mean and the standard deviation, each of which should be within 20% of their respective truth value from the same acre. Here, the "true value" is that produced by state-of-the-art measurements taken at the Phase 1 sites. Refer to DE-FOA-0002250/ DE-FOA-0002251 Section I.E for updates to the technical requirements for soil carbon estimation.

Q14. We are a team from ... looking into applying for Phase 2 of the SMARTFARM FOA. Is it possible to get a copy of the slide deck from the April 28, 2020 webinar?

ANSWER: The slide deck can be viewed by watching the webinar

<https://www.youtube.com/watch?v=JXJYJXreWrA>.

Q15. A researcher at my university in Canada has been invited to participate as a project team member on this FOA. However, I am concerned about our ability to participate based on this clause on the top of p. 26 of the announcement (modification 3).

Foreign entities must designate in the Full Application a subsidiary or affiliate incorporated (or otherwise formed or to be formed) under the laws of a State or territory of the United States to receive funding. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate.

As a Canadian university, we have no subsidiary in the USA. I think this is saying we cannot participate. Please help me understand if there is some way we can participate without a subsidiary -

ANSWER: As set forth at FOA Section III.A.3:

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All work under the ARPA-E award must be performed in the United States. The Applicant may request a waiver of this requirement in the Business Assurances & Disclosures Form, which is submitted with the Full Application and can be found at <https://arpa-e-foa.energy.gov/>.

Q16. I am inquiring on uploading equipment quotes into the SF-424 workbook. After selecting insert – object function in MS excel we receive a message saying “cannot insert object”, is this the correct way to insert quotes?

ANSWER: Refer to SMARTFARM FAQ 10.2.

Also for subrecipients incurring less than 10% of the budget, where should the supporting documentation justifying their proposed budget be uploaded or inserted.

ANSWER: Refer to SMARTFARM FAQ 10.2.

Q17. We have a question regarding how demonstration of our technology at the Phase 1 selected farm sites, as is listed as required in the FOA, should be incorporated into our proposal's budget and schedule. We currently lack any details regarding those sites at the moment, so I do not expect that we are expected to provide such details for the purposes of the full application materials.

Would it suffice to explain in the proposal that we plan to deploy and study our sensor technology at our own farm locations for the majority of the duration of the project whilst we develop and verify our technology and build our N2O flux models, and state that the goal of the project will be to demonstrate our technology at the Phase 1 during the latter few months of the duration of the project. For example, will it suffice to build in a few month long or so period of time in our schedule (Gantt Chart) to demonstrate our complete technology, or does the FOA require a more detailed explanation of how, where, when we will be deploying the technology on the Phase 1 sites?

ANSWER: That level of explanation is sufficient for the proposal. ARPA-E will facilitate introductions between the Phase 1 and 2 teams at the beginning of the Phase 2 performance period so that teams can begin coordinating deployment locations and timing.

Q18. Are we required to provide Pending and current information for “other Senior Personnel”[?] [T]he guidelines state PI and Co-PI, we are wanting to confirm if that this applies to other senior personnel also.

ANSWER: As set forth in Part 3 of the Business Assurances & Disclosures form:

*Does the **Applicant or any other member(s) of the Project Team** (including, without limitation, the PI or any Co-PI(s)), have any applications for **this project** or for **related work** (i.e., work that relates directly or indirectly to the proposed R&D project) pending with any **Federal or non-Federal entity** (including, without limitation, industry, private investors, and foreign, state, or local governments)? (emphasis in the original)*

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Q19.1 Are there limitations on the numbers of Co-PIs and/or Senior Personnel allowed on the project?

ANSWER: No. Merit Review criteria for this FOA provide for an assessment of the Qualifications, Experience, and Capabilities of the Proposed Project Team.

Q19.2 We would appreciate additional details about the Technology Transfer & Outreach Activities for Phase II, beyond the examples provided in the FOA [Section IV.G.8], on page 47, if possible:

Q19.2a For example, should these activities be included/listed in the tasks in Section 2 of the Technical Volume, potentially with milestones?

ANSWER: Applicants must review the technical requirements of the FOA and independently determine the content of their Application.

Q19.2b Do details need to be provided for the budgeting of the costs for these activities?

ANSWER: Refer to FOA Section IV.D.3.

Q19.2c Are there any other details regarding the type of reporting that will be expected for these TT&O activities during the funding period?

ANSWER: Refer to Attachment 4 of ARPA-E's Model Cooperative Agreement, found at <https://arpa-e.energy.gov/?q=site-page/funding-agreements>.

Q19.2d Should partners be identified in the proposal for these activities, and if this is done, would it change the cost share requirements?

ANSWER: Assuming "partners" to be synonymous with "sub-recipient" as that term is defined at 2 C.F.R. § 200.93, the Technical Volume Template prompts prospective applicants to discuss the roles and responsibilities of the organizations on the proposed Project Team, and the Merit Review criteria for this FOA provide for an assessment of the Qualifications, Experience, and Capabilities of the Proposed Project Team. Moreover, FOA Section IV.D.3 sets forth instructions for presenting sub-recipient budgets to ARPA-E. Cost sharing requirements are described at FOA Sections III.B.1-3, and are based upon the amount of work accomplished by Project Team members as measured by the proportion of project costs incurred by each.

Q19.2e Are there any recommendations or guidelines regarding what is expected for the progress in the technology transfer to market or TT&O activities by the end of the Phase II funding period?

ANSWER: TT&O activities and expectations will vary depending on the technology to be developed, but all Phase 2 teams will be expected to use these funds to promote and further the development and deployment of ARPA-E-funded technologies. Please see Section IV.G.8 for examples of TT&O expenditures.



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Q20. I am assisting with a proposal that will be submitted to the ARPA-E SMARTFARM program (DE-FOA-0002250) and we are having issues with the Budget Justification / SF-424A Workbook that was provided as a download under the solicitation's Required Application Document section. Some of the tabs have protected worksheets (Fringe Benefits and Indirect Costs) and they do not allow any total costs to be populated for those budget items so we are unable to complete the budget. Can you please advise if there is another version of this document that we can use that does not have these errors?

ANSWER: Applicants can calculate Fringe Benefit and Indirect Cost amounts by editing cells D10-G10 (Fringe) or D9-G9 (Indirect) in the respective worksheets.