SMARTFARM Webinar Q&A

Q1 [Standard FOA FAQ]: Would a partial solution, e.g. a better N_2O sensor on its own, be of interest? Page 22 of BAA version suggests that: "Alternatively, submissions requiring proof-of-concept R&D can propose a project with the project end deliverable being an extremely creative, but partial solution."

Q1 [SBIR FAQ]: Would a partial solution be of interest under the SBIR version? That version seems to assume a comprehensive solution as the only approach.

A1 [both questions]: Applications to develop a new sensing modality, utilize existing sensing modalities in new ways, or utilize some combination of in-field sensing, remote sensing, and modeling, will all be evaluated in terms of cost, operational complexity and certainty. Please refer to Section III.F.3, Submissions Specifically Not of Interest for guidance on partial solutions; specifically: "Submissions for component solutions (e.g. sensors, models) that cannot produce the desired output on their own, and do not integrate into a larger system solution" are not of interest.

Q2: What is the maximum budget for one proposal?

A2 [Standard FOA]: See Section II.A (Award Overview) of the FOA. ARPA-E may issue one, multiple, or no awards under this FOA. Awards may vary between $250,000 and $10 million. Cost share requirements are provided in Section III.B of DE-FOA-0002250.

A2 [SBIR FOA]: See Section II.A (Award Overview) of the FOA. ARPA-E may issue one, multiple, or no awards under this FOA. Combined Phase I/II/IIS awards may be funded up to $3,677,642. No cost share is required for awards under DE-FOA-0002251.

Q3: Does the program take into account the fact that biofuels only barely break even in energy returned on invested sometimes? The input factors are obviously contributing to CO_2 emissions.

A3: No. The FOA focuses on technologies to quantify nitrogen emissions and soil carbon in agricultural environments. Downstream processing approaches are beyond the scope of this program.

Q4: Smaller labor intensive farms and even subsistence farming produce less carbon emissions than industrial scale farming. So why the requirement that the area has to be greater than 80 acres?

A4: The sensor requirements targets a resolution of at least 1 acre with the ability to be scalable to >80 acres to appropriately address environmental variabilities in the field. This is also to ensure that the sensors under development can accommodate a broad range of field sizes.

Q5: In category 1, is there a need to demonstrate the technology both with and without N fertilizers, or just at normal farmer-applied rates?

A5: The focus of category 1 is to measure the change in N_2O emissions. The sensor's dynamic range to measure this change should cover the full spectrum of expected fertilization.

Q6: Will Phase 2 proposers necessarily have to work with Phase 1 performers on Phase 1 sites?

A6: Successful projects in this Phase 2 of the portfolio will be required to test their technologies at one or more of the Phase 1 sites. Teams will be allowed to conduct field testing at other sites throughout the duration of the project, but, at minimum, key system demonstrations must occur at a Phase 1 site. However, Phase 2 full applications do not need to provide letters of support from a Phase 1 team, or identify a specific Phase 1 site and list a specific test plan for that site. Instead, full applications can just generally describe how the technology will be demonstrated at a Phase 1 site.

Q7: Are the new sensors to be demonstrated at the Phase 1 sites at the end of the period for demonstration, or are they only to be deployed at the Phase 1 sites?

A7: Refer to SMARTFARM FAQ 6.

Q8: Do we need to connect to Phase 1 team(s) for Phase 2 full proposal development?

A8: No, Phase 2 teams are not expected to connect with Phase 1 teams during full application development.

Q9: Can you expand further on the "no central hub" for data/analytics?

A9: 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.

Q10: Can you confirm that the feedstocks in Phase 1 were Corn, Rice, Soybeans and Grain Sorghum? Were there others?

A10: The feedstock types are dependent on each site location and crop rotation. A subset of corn, soybean, sorghum, and rice will be grown at each Phase 1 site. Additional information about the Phase 1 sites can be found in the SMARTFARM webinar, the Phase 1 website, and the Phase 1 FOA (DE-FOA-0001953, Topic H).

Q11: What crops are included in Phase 1 sites?

A11: Refer to SMARTFARM FAQ 11.

Q12: When the final Phase 2 systems are tested in the Phase 1 trial fields, can some of the historical Phase 1 data be used as the input for Phase 2 systems?

A12: During the project performance, Phase 2 projects will have the opportunity to use data from Phase 1 teams as input for Phase 2 systems, but should not solely rely on Phase 1 data for sensor development. Any use of Phase 1 data to improve or develop Phase 2 sensors before the data has been publically released will need to be requested from ARPA-E and Phase 1 performers, and ARPA-E will facilitate those requests.

Q13: Are there guidelines in how the uncertainty of the Phase 1 measurements will be propagated when the measurements are used to evaluate Phase 2 technologies?

A13: No guidelines are provided at this time. Uncertainty propagation will be assessed on a case by case bases and will be dependent on the proposed technology and Phase 1 output.

Q14: What level of detail is needed for budget justification of equipment and for materials and supplies? Are quotes needed or other documentation for items > a given $ amount?

A14: Please see Section IV.D.3 of both DE-FOA-0002250 and DE-FOA-0002251for guidance regarding the budget justification.

Q15: Are the slides for this presentation going to be available afterwards?

A15: The presentation can be viewed by clicking the following link: SMARTFARM webinar

Q16: Is there a pre-application process?

A16: There is no pre-application required to submit a full application.

Q17: Can you comment on ARPA-E's expectations for application of robust systems engineering practices? Do you want to see an SEMP or SEP?

A17: In general, ARPA-E expects robust systems engineering practices. Specific system engineering requirements are not included in the FOA.

Q18: Does this FOA exclude any feedstock?

A18: This focus of the FOA is on sensor development, but teams are expected to demonstrate the sensing tools on a bioenergy relevant feedstock.

Q19: Given the small change in carbon over time, do you expect the carbon measuring to happen only once a year (e.g. after harvest) or do you require the instrument to be able to measure several times per year?

A19: The carbon measuring requirement will be limited by cost, accuracy, and uncertainty.

Q20: Will those who haven't submitted concept papers before be able to submit full applications?

A20: Yes.

Q21: We had a team for the concept paper, which was encouraged by DOE to submit a full proposal. Can we reorganize the team for the full proposal?

A21: Team arrangements can be modified post concept paper submission.

Q22: Are you expecting some academic-industry collaboration, or do you prefer academic institutions/industry?

A22: ARPA-E selects the most qualified teams and submissions, pursuant to the merit review criteria and Program Policy Factors identified in the FOAs, so has no pre-conceived preference for academic, industry, or mixed teams.

Q23: Do you have any limitation in terms of size of the system as well as power consumption?

A23: Sensor system size and power are not specified. Sensor system is restricted only by cost and performance.

Q24: Does ARPA-E have access to databases of various kinds of sensor data that can be integrated with data collected from a farm?

A24: ARPA-E does not have a database of sensor options and data types to provide to applicants.

Q25: Are cost share requirements triggered if industry partners join as unfunded partners?

A25: Cost share requirements for proposals with, and without industry partners, are specified in DE-FOA-0002250. No cost share is required for awards under DE-FOA-0002251.

Q26: Given that many of these sensing approaches are new, how much effort in the proposal can be dedicated to high precision 'ground truthing' activities that are too expensive for the final system but can demonstrate the sensing system is giving accurate values?

A26: Ground truth data will be provided and compared against by Phase 1 performers.

Q27: Is it permissible to discuss potential responses with ARPA-E program directors?

A27: Refer to FOAs Section VII.A (Communications with ARPA-E). All communications with ARPA-E must be sent to the ARPA-E Contracting Officer inbox (ARPA-E-CO@hq.doe.gov) until after ARPA-E's public announcement of its project selections.

Q28: The set operation cost of "<$50 /acre/year at commercial scale" for NO2 detection system should be understood as the only the total of material & labor cost of the system or it is an expected price tag that also includes the margin for a business?

A28: The operational cost target should only include the material and labor cost of the system, not including the margin for a business.

Q29: Is ARPA-E expecting a value of carbon gain per acre year are also where it goes within the soil profile?

A29: ARPA-E expects a measureable carbon value change per year with the proposed technology. Any insight on the source of carbon change and change within the soil profile is a plus but not a requirement of the FOA.

Q30: Where do we find information on the Phase 1 funded projects?

A30: A list of the selected Phase 1 projects is available on the ARPA-E website (https://arpa-e.energy.gov/?q=news-item/arpa-e-innovating-through-unconventional-ideas under 'Establishing Validation Sites for Field-Level Emissions Quantification of Agricultural Bioenergy Feedstock Production'). Details regarding the data collection requirements for the Phase 1 teams can be found in

the Phase 1 FOA (DE-FOA-0001953, Topic H), and a map of the proposed sites can be found in the SMARTFARM webinar.

Q31: Clarification about system operation cost: the price quoted is at commercial, but system will still be in development Phase, how does this reconcile with the earlier statement of having to meet all requirements listed?

A31: While the proposed program is at the R&D stage, we need a price walk to get the estimated cost from R&D cost to targeted commercial cost.

Q32: Can you elaborate more on the system cost issue? How do we calculate the amortization of higher costs over the lifetime of the systems?

A32: Amortization of higher costs over the lifetime of the system can be estimated or assumed in the full application. Any estimates or any assumptions made need to be identified and appropriately justified in the full application.

Q33: Is Phase 2 participation independent of Phase 1 participation?

A33: Organizations participating on Phase 1 teams are not precluded from participating in Phase 2.

Q34: Do the target metrics listed in the FOA need to be met during the funding period, or are they long term goals?

A34: The expectation is that teams will submit a full application describing a technical approach capable of meeting the program goals by the end of the performance period

Q35: Does ARPA-E take any ownership of the IP developed by a company funded by this program?

A35: No, subject to certain conditions and retained government rights. See Section VIII of the SMARTFARM and SMARTFARM SBIR/STTR FOAs.

Q36: Can applicants propose to both categories (N2O emission and Soil Carbon Estimation) of Phase 2? If so, should a single proposal package include proposed solution to both categories?

A36: A single submission may address both categories so long as a single system is being proposed to address those categories. If two separate systems are to be developed, one for each category, two applications should be submitted.

Q37: Can Phase 1 performers participate (prime or sub) in Phase 2 proposals?

A37: Yes, this solicitation is open to all eligible applicants. See Section III of the SMARTFARM and SMARTFARM SBIR/STTR FOAs for eligibility information.

Q38: Can foreign institutes or companies apply?

A38: Yes, subject to the conditions and requirements in Section III.A.3 of the SMARTFARM FOA

Q39: What type of communication should Phase 2 performers expect to have with Phase 1 performers?

A39: Phase 1 and 2 teams will be encouraged to coordinate early and often in the performance period. Additionally, the Phase 1 FOA lists that Phase 1 teams are to make their data available to the public.

Q40: Are funded projects expected to test their technologies at one of the Phase 1 ground truthing sites?

A40: Yes.

Q41: Will the performance of the SMARTFARM sensors be assessed more on their accuracy to existing technologies, or their sensitivity for analytes?

A41: ARPA-E cannot provide guidance on how the merits of a proposed technology will be assessed during the review.

Q42: Do the technologies need to be demonstrated in farmers' fields, or are research fields/laboratory-based acceptable? What scale needs to be demonstrated (> 80 acres in the Technical Performance Targets)?

A42: Systems will need to be demonstrated at one or more of the Phase 1 sites, the details of which are listed in Section A of DE-FOA-0001953, Topic H. For details regarding how the technologies will be evaluated in these environments, see Section I.E for Uncertainty measurements.

Q43: What are the sensor collection time, response time, update rate, and data latency requirements for SOC and N2O?

A43: ARPA-E did not explicitly set requirements for these timing parameters. Although N2O emissions measurement is more dynamic than SOC, both have slow responses relative to most interrogation methods. As a result, the operational cost and system accuracy will dictate these timing requirements.

Q44: Are the uncertainty and variation requirements at the sensor/sampling-level output or system level output?

A44: The uncertainty and variation of the outputs are assessed at the system's level. Thus, uncertainty and error need to be propagated to the level of >80 acres measurement/estimation output.

Q45: Do the performance requirements need to be demonstrated across the full environmental (temperature, humidity, wind, etc.) range conditions?

A45: Yes, all field-deployed hardware need to meet the following environmental tolerances: Temperature: -10 to 110 F, Wind: 50 mph, Humidity: 0 to 100%, protection against dust and rain.

Q46: What will the Phase 2 sensors be compared against? How will the field test campaigns be scheduled and assigned?

Q46: Phase 2 system outputs (See “Key Outputs” in Section I.E. (Technical Performance Targets)) will be compared against the key outputs of the Phase 1 site at which the Phase 2 system is deployed. For both, the output will be aggregated to the field size (80 acres or greater, depending on the site). Field testing campaigns will be scheduled based on Phase 2 development time and the timing of the season for the individual Phase 1 sites. Prototype systems will need to be ready for deployment in advance of the “critical season” (defined in Section E, Technical Performance Targets of the SMARTFARM FOA) at whichever Phase 1 site is to be used.