

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. Questions for week ending: APRIL 15, 2016**

**Q1. Is a foreign researcher eligible for being a Co-PI or Collaborator in this project?**

**ANSWER:** Principal Investigators and other team members who are employees of eligible, qualified entities need not be U.S. citizens or permanent residents. This is not to be confused with foreign work limitations which are addressed in the FAQ: General Questions Section of ARPA-E's web site <http://arpa-e.energy.gov> and the FOA. Per Section III.A.1 (Individuals) of the FOA, only "U.S. citizens or permanent residents may apply" to the FOA in their individual capacities.

Note: As set forth in ARPA-E's standard terms and conditions, Awardees are responsible for compliance with applicable Federal, state, and local laws and regulations when performing work under any ARPA-E award, including those regarding immigration and export control (refer to Attachment 1, Clause 4 of ARPA-E's Model Cooperative Agreement on eXCHANGE, found at [http://arpa-e.energy.gov/arpa-e-site-page/award-guidance#Cooperative Agreements](http://arpa-e.energy.gov/arpa-e-site-page/award-guidance#Cooperative%20Agreements)).

**II. Questions for week ending: APRIL 29, 2016**

**Q2. I was wondering if you have any insight about foreign participants in relation to DE-FOA-0001565 "Rhizosphere Observations Optimizing Terrestrial Sequestration (ROOTS)". The announcement indicates that a waiver request on the Business Assurances Form must be made to perform work outside of the United States. My questions are:**

- 1. Are foreign work waivers historically granted without question or are there criteria that the "rationale for performing work overseas" must meet?**
- 2. Is it advisable to have a domestic investigator as Project Team leader, even if a significant amount of work will be performed overseas?**

**ANSWER:** Please see the response to question 3.1 on the ARPA-E Website (<http://arpa-e-foa.energy.gov>) FAQ page General Questions section.

**Q3. My two questions are:**

- 1) As a potential applicant, can our submission only address Component (Genetics and Environment)?**
- 2) If an integrated team is a must, does organizing a team including three components solely lie in the applicants' efforts?**

**ANSWER:**

1. As described in the FOA at Section I.D (Technical Categories and Components), submissions must either discuss the three Components (i.e., Component A (Sensors), Component B (Models), and Component C (Genetics and Environment)), or Component A exclusively.
2. Whether to form “an integrated team” is up to the applicant. ARPA-E does not assist in forming teams. There is a teaming list on the ARPA-E website (<https://arpa-e-foa.energy.gov/#Foaldf0c341db-eab5-43d4-a585-b88a0e3ef801>) and applicants are encouraged to be proactive in finding teaming partners

**Q4. I just found your RFI on ROOTS. This is great if these plants can be modified to put CO2 back into the soil. What about [brief description of concept]?**

**ANSWER:** ARPA-E will not pre-assess a potential applicant's proposed technology. Applicants must review the DE-FOA-0001565 ROOTS Funding Opportunity Announcement (FOA) to determine the applicability of their technology to the requirements of the FOA.

**Q5. An error occurs in Figure 4 [in Section I.B.2] on page 10 of this FOA.**

**The Y-axis scale of the figure reads 0, 1, 2, 3, 4. However, it should read 0, 10, 20, 30, 40. Or, conversely, the units for the Y-axis should be g/m<sup>2</sup> rather than kg/ha per mm of rainfall.**

**The data for this figure were derived from Table 1 in Sadras et al. (Status of water use efficiency of main crops. SOLAW Background Thematic Report – TR 07, United Nations FAO; 2010). In this table the reported yield values for the three crops (maize, wheat and rice) range from near zero to 37 kg/ha per mm of rainfall – not 3.7 kg as shown in Figure 4 of the FOA.**

**The error is a minor detail and does not affect the overall thrust of the figure, but for the sake of accuracy, you may want to correct the Y-axis of this figure.**

**ANSWER:** ARPA-E thanks Dr. Frank Forcella, Research Agronomist at the USDA-ARS Soils Lab in Morris, MN for this question. The information set forth in the question is correct. Prospective applicants may rely upon this information in preparing their concept papers. ARPA-E will correct the FOA in the near future.

**Q6. I wanted to know if only genetic approaches for crop improvement would be considered relevant to the [FOA]. For example, could one utilize environmental or chemical treatments to control root traits. Would such methods be considered relevant to the [FOA]?**

**ANSWER:** Genetic approaches, including breeding approaches, are encouraged. However chemical or environmental traits are both relevant approaches provided they meet the stated goals of the FOA in section 1.D. As noted in Q3 above, all projects must be coupled to sensor development efforts.

**Q7. I AM EMAILING TO GET CLARIFICATION ON THE GUIDELINES FOR FOREIGN ENTITIES IN THE ROOTS FOA. CAN I BE A CO-PI FROM [A FOREIGN INSTITUTION]?**

**ANSWER:** See the response to Q2 above.

**III. Questions for week ending: MAY 13, 2016**

**Q8. ARE COVER CROPS AN ACCEPTABLE TOPIC FOR THE ROOTS COMPETITION. MORE SPECIFICALLY, WE HAVE A GROUP THAT IS INTERESTED IN PUTTING IN A CONCEPT PAPER ON THE IDEA OF DOING COVER CROP BREEDING AND GENOMICS, AND ALSO EVALUATION OF NOVEL COVER CROP SPECIES, FOR THEIR POTENTIAL TO SEQUESTER INCREASED AMOUNTS OF CARBON DIOXIDE.**

**ANSWER:** As described in the FOA, all programs must develop a novel sensor component to measure below ground or soil processes. Cover crops would be a suitable system to improve using these technologies provided the FOA requirements are met.

**Q9. WE HAVE BEEN APPROACHED AS A POTENTIAL MEMBER OF TWO PROJECT TEAMS FOR THE RHIZOSPHERE OBSERVATIONS OPTIMIZING TERRESTRIAL SEQUESTRATION (ROOTS) FOA. WE WOULD PARTICIPATE AS A SUBRECIPIENT IN EITHER OR BOTH INSTANCES. IS THERE A LIMITATION ON HOW MANY PROJECT TEAMS A SINGLE DOMESTIC ENTITY CAN BE A MEMBER OF?**

**ANSWER:** There is no limitation on the number of project teams that an entity can be named to.

**Q10. SEVERAL QUESTIONS:**

- 1. WILL ARPA-E ENTERTAIN THE USE OF TRANSGENIC PLANTS AS PART OF THE ROOT PHENOTYPING APPROACH?**
- 2. DOES THE ROOTS OPPORTUNITY INCLUDE FUNCTIONAL PHENOTYPING, SUCH AS OF ROOT-INSECT INTERACTIONS OR ROOT-MICROBE INTERACTIONS.**
- 3. MUST THE PLANT SPECIES AT THE CONCEPT LEVEL BE A CROP PLANT. OR IS ARABIDOPSIS AN OPTION?**

**ANSWER:**

1. Yes, see FOA Section I.D (p.19) of the FOA
2. Yes, provided the sensor used to detect this interaction fits FOA metrics regarding field applicability and throughput (see FOA Section I.D, p.17,21, and FOA Section I.E, p.23) to inform breeding or management decisions
3. Crop plants are preferred, see FOA Section I.E, p.24.

**Q11. WOULD DOE CONSIDER A SENSOR BASED ON [DESCRIPTION OF TECHNOLOGY]? THE RESOLUTION AND PENETRATION DEPTH OF THIS SENSOR WOULD BE SUCH THAT INTERNAL ROOT STRUCTURE WOULD BE DIRECTLY OBSERVABLE AND POSSIBLY SOME CELLULAR STRUCTURE.**

**ANSWER:** The measurement of internal structure and function, or “root morphology” in the FOA, are suitable targets of improvement. Prospective applicants must address the field applicability and translation of these technologies as described in FOA Section I.D (pp.17,21) and FOA Section I.E (p.23), and any shortcomings identified in introductory FOA Section I.A.3 (pp.12,13).

**Q12. ON PAGE 41 OF THE RHIZOSPHERE OBSERVATIONS OPTIMIZING TERRESTRIAL SEQUESTRATION (ROOTS) FOA APPEARS THE STATEMENT,**

**"EACH CONCEPT PAPER SHOULD BE LIMITED TO A SINGLE CONCEPT OR TECHNOLOGY. UNRELATED CONCEPTS AND TECHNOLOGIES SHOULD NOT BE CONSOLIDATED INTO A SINGLE CONCEPT PAPER." HOW BROADLY/NARROWLY ARE WE TO INTERPRET THE TERMS "UNRELATED," "CONCEPT," AND "TECHNOLOGY?" IN MANY PARTS, THE FOA CALLS FOR INTEGRATED SYSTEMS.**

**P. 4: "THESE TECHNOLOGIES—ESPECIALLY INTEGRATED SYSTEMS—COULD GREATLY INCREASE THE SPEED AND EFFICACY OF DISCOVERY, FIELD TRANSLATION, AND DEPLOYMENT OF IMPROVED CROPS AND PRODUCTION SYSTEMS THAT SIGNIFICANTLY IMPROVE SOIL CARBON ACCUMULATION AND STORAGE, DECREASE N2O EMISSIONS, AND IMPROVE WATER EFFICIENCY."**

**P. 18: "ARPA-E'S PREFERENCE IS FOR SUBMISSIONS THAT ADDRESS ALL THREE COMPONENTS".(SENSORS, MODELS, G X E)**

**WOULD AN INTEGRATED SYSTEM OF MANY TECHNOLOGIES TO BE DEVELOPED WITH THE OBJECTIVE OF MONITORING ROOT GROWTH/STRUCTURE FUNCTION/PRIMARY PRODUCTIVITY..., I.E., EVERYTHING "ROOT" AND PHENOTYPIC EXPRESSION BELOW AND ABOVE GROUND QUALIFY AS A SINGLE CONCEPT?**

**OR ARE WE ON OUR OWN IN INTERPRETING THIS BY MAKING OUR CASE IN THE CONCEPT PAPER?**

**ANSWER:** Prospective applicants must review the technical requirements of the FOA and independently determine whether their proposed concept warrants a submission. A single concept can include a collection of technologies.

**Q13. CAN WE INCLUDE LETTERS OF SUPPORT FROM VARIOUS COMPANIES OF INTEREST WITH OUR 4 PAGE SUBMISSION AND WILL IT BE SEPARATE FROM OUR MAXIMUM PAGE SUBMISSION OF 4 PAGES?**

**ANSWER:** Letters of support may be included or cited in the Concept Paper but in both cases will count towards the maximum page limitation for the Concept Paper. ARPA-E will only review the authorized number of pages, starting with the first page and disregard any additional pages exceeding the limit. Please refer to the “Content and Form for Concept Papers” section of the FOA (Section IV.C) for applicable page limitations.

**Q14. I AM CURRENTLY WORKING ON A ROOTS CONCEPT PAPER WITH ONE GROUP AND HAVE BEEN ASKED BY A SECOND GROUP TO ALSO BE A CO-INVESTIGATOR.**

**ANSWER:** See General FAQ 6.13, found at [HTTP://ARPA-E.ENERGY.GOV/?Q=FAQ/GENERAL-QUESTIONS](http://arpa-e.energy.gov/?Q=FAQ/GENERAL-QUESTIONS).

**IV. Questions for week ending: MAY 19, 2016**

**Q15. WE ARE DEVELOPING A SENSOR TECHNOLOGY TO ENABLE ESTIMATION OF SOIL CHARACTERISTICS RELEVANT TO THE ROOTS OBJECTIVES. TO BE CONSIDERED FOR FUNDING, IS IT NECESSARY THAT WE WORK WITH A SPECIFIC CROP OR IS IT SUFFICIENT TO EVALUATE OUR TECHNOLOGY WITH SOIL SAMPLES EXHIBITING THE RANGE OF CHARACTERISTICS WE INTEND TO MEASURE?**

**ANSWER:** As described in Section I.D, (p.18) of the FOA, a program could develop only a sensor that would be judged for sensor metrics (refer to Section I.E, pp. 21,23) as appropriate. These applications will be considered for awards of shorter duration and smaller amounts supporting proof-of-concept demonstrations.

**V. Full Application Phase Questions:**

**Q16. I am leading a response to the ROOTS FOA, and preparing a Full Application. I am playing a secondary role in a ROOTS project that is also preparing a Full Application. Now as the plans are getting further developed I see an opportunity for the two projects to at least interact - fusion into a bigger project is also conceivable just based on the science. I am wondering if there is any official procedure for connecting two proposals?**

**ANSWER:** Prospective applicants are responsible for the content of their Full Applications. Also, there is no “procedure for connecting two proposals.” Refer to FAQ 7.23, found at [HTTP://ARPA-E.ENERGY.GOV/?Q=FAQ/GENERAL-QUESTIONS](http://arpa-e.energy.gov/?Q=FAQ/GENERAL-QUESTIONS), for additional information.

**Q17. WE ARE WORKING WITH A GOGO ON OUR ROOTS PROPOSAL, AND WE HAVE A QUESTION ABOUT HOW FUNDS WILL BE DISBURSED TO THEM UPON AWARD. SINCE DOE WOULD CONTRACT WITH THEM DIRECTLY, WOULD ALL THEIR FUNDS BE DISBURSED TO THEM IMMEDIATELY AND THEN HAVE TO BE SPENT IN THE FISCAL YEAR IN WHICH THEY ARE RECEIVED? OR WILL THEY BE ABLE TO ROLL FUNDING OVER FROM ONE FISCAL YEAR TO ANOTHER THROUGH THE LIFE OF THE PROJECT IF NEEDED?**

**ANSWER:** Monies appropriated for this FOA to ARPA-E are non-expiring and are available throughout the award term.

**Q18. I AM HELPING TO COORDINATE THE SUBMISSION OF A FULL PROPOSAL IN RESPONSE TO DE-FOA-0001565. \*\*\*\*\* (FFRDC) IS THE LEAD, AND WE HAVE TWO COLLABORATING SUBRECIPIENTS: ONE NON-PROFIT AND ONE SMALL BUSINESS.**

**MY QUESTION PERTAINS TO THE CERTS AND ASSURANCES FORM. IN THE SF 424 PDF, QUESTION 21 IS A CHECKBOX REQUIRING A SIGNATURE, AND IT MAKES REFERENCE TO THE CERTS AND ASSURANCES FORM ATTACHED. HOWEVER, I DO NOT SEE A PLACE TO ATTACH THE C&A FORM, AND CHECKING THE BOX DOES NOT PROPERLY CONVEY THE ANSWERS SOLICITED BY THE C&A FORM, PARTICULARLY FOR OUR SUB-RECIPIENTS. COULD YOU PLEASE LET ME KNOW THE PROPER METHOD FOR DEALING WITH THE CERTS AND ASSURANCES?**

**ANSWER:** Refer to FOA Section IV.D.2 for instructions on locating and completing the certifications and assurances. Applicants may scan their completed certifications and assurances along with their SF-424 and submit them through ARPA-E eXCHANGE in .pdf format,

**Q19. In Table 1 in the FOA it says: ">500 plants, 3 times per season, in translatable conditions". Does this mean >500 individuals, or 500 accessions? (In Table 2, it says: "2 hectares with 2000 plant accessions each measured 3 times during growing season").**

**ANSWER:** The throughput of the sensor platform should be at least 500 individual plants, three times per season.

**Q20. Are Molecular Trait Association Networks, such as relating transcript, protein or metabolite profiles to root traits acceptable models under Category 1?**

**ANSWER:** As described on page 24 of the FOA, as long as a model that utilizes data collected from plants and/or the soil support the identification of new root ideotypes, the identification of

genetic markers or causal genes, and improve the success rate of field validation trials, then ARPA-E is agnostic about the type of model developed under Category 1 projects.

**Q21. We are proposing a combined Category 1 and Category 2 project. Does this mean that it suffices to meet either of the Cat1 or Cat2 requirements listed for Sensors, Models, and Genetics & Environment (p 19-20 in the FOA), or do we need to address both Cat1 and Cat2 requirements?**

**ANSWER:** As described on pages 23-25 of the FOA, applicants should describe how their platforms will meet the Cat1 metrics for identifying key ideotypes and the Cat2 metrics for screening plants and soils in the field.

**Q22. We are a proposed subrecipient on an ARPA-E proposal. Our task is to evaluate the phenotype of 500 poplar genotypes. The growth and evaluation of plants is a service that we offer to the public, and we have done business with many private sector clients using this price structure. Attached is a screenshot of our standard pricing for a service offering (omitted). We have also committed to provide cost share for the project.**

**How can we use our established pricing structure to justify our budget, as opposed to doing a detailed cost breakdown for all labor, overheads, and materials? Any other advice?**

**ANSWER:** A non-Federal entity may receive awards as, inter alia, a subrecipient or a contractor. The latter term is defined at 2 CFR § 200.23, the former at 2 CFR § 200.93. Features that characterize whether a non-Federal entity is receiving Federal funds as either a subrecipient or contractor can be found at 2 CFR § 200.330.

Except as provided for by 2 CFR § 200.201 and 2 CFR § 200.332, awards to subrecipients must be cost-reimbursable and are subject to the cost principles as set forth at 2 CFR Part 200, Subpart E, except for for-profit entities that are subject to the cost principles as set forth at 48 CFR Chapter 1, Subpart 31.2. Subrecipients must provide budget information on the Budget Justification Workbook/SF-424A if required by FOA Section IV.D.3.

Except for the limitation set forth at 2 CFR § 200.323(d), contracts may be cost-reimbursement or fixed-price. Amounts proposed for contracted services must be supported with the information set forth in ARPA-E's Budget Justification Guidance (p.7).

Cost share requirements are described at 2 CFR § 200.306, and among other things must be verifiable from the non-Federal entity's records.



CHANGING WHAT'S POSSIBLE

## DE-FOA-0001565 – ROOTS

Questions can be sent to [ARPA-E-CO@hq.doe.gov](mailto:ARPA-E-CO@hq.doe.gov)

FIRST DEADLINE FOR QUESTIONS TO ARPA-E-CO@HQ.DOE.GOV: 5 PM ET, MAY 19, 2016

SECOND DEADLINE FOR QUESTIONS TO ARPA-E-CO@HQ.DOE.GOV: 5 PM ET, AUGUST 30, 2016

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