

## QUESTIONS AND ANSWERS

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I. FREQUENTLY ASKED QUESTIONS:

**Q1. If I have questions about this funding announcement, who do I contact?**

**ANSWER:** Please see the FOA guidance on submitting FOA content questions and response publication. Applicants may submit questions regarding this ARPA-E's Funding Opportunity Announcement (FOA) to [ARPA-E-CO@hq.doe.gov](mailto:ARPA-E-CO@hq.doe.gov). All emails must include the FOA name and number in the subject line. The cover page and Executive Summary of the Funding Opportunity Announcement state the deadlines for submitting questions to [ARPA-E-CO@hq.doe.gov](mailto:ARPA-E-CO@hq.doe.gov).

**Q2. How will I receive a response to questions submitted to [arpa-e-co@hq.doe.gov](mailto:arpa-e-co@hq.doe.gov) about this FOA?**

**ANSWER:** Responses are posted in the "Frequently Asked Questions" section of ARPA-E's website. There are general FAQs and a FAQ page for each FOA.

ARPA-E will post responses on a weekly basis to any questions that are received.

ARPA-E will cease to accept questions approximately 5 business days in advance of each submission deadline. Responses to questions received before the cutoff will be posted approximately one business day in advance of the submission deadline. ARPA-E may re-phrase questions or consolidate similar questions for administrative purposes.

**Q3. Will ARPA-E post a response to every question submitted to [arpa-e-co@hq.doe.gov](mailto:arpa-e-co@hq.doe.gov)?**

**ANSWER:** No. ARPA-E will only post responses to questions that have not already been addressed by a published FAQ. Also, ARPA-E may consolidate similar questions for administrative purposes.

**Q4. If I have questions about arpa-e exchange, who do I contact?**

**ANSWER:** Applicants may submit questions regarding ARPA-E's online application portal, ARPA-E eXCHANGE, to [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov). All emails must include the name and number of the Funding Opportunity Announcement in the subject line.

**Q5. Can I speak or meet with the ARPA-E program director or other ARPA-E personnel about this funding opportunity announcement?**

**ANSWER:** No. Upon the issuance of this Funding Opportunity Announcement (FOA), ARPA-E Program Directors and other ARPA-E personnel are prohibited from communicating (in writing or otherwise) with Applicants, or potential Applicants, regarding the FOA. This "quiet period" remains in effect until ARPA-E's public announcement of its project selections. During the "quiet period," Applicants may submit questions regarding the FOA to [ARPA-E-CO@hq.doe.gov](mailto:ARPA-E-CO@hq.doe.gov) with the FOA name and number in the subject line. Applicants may also submit questions regarding ARPA-E's online application portal, ARPA-E eXCHANGE, to [ExchangeHelp@hq.doe.gov](mailto:ExchangeHelp@hq.doe.gov) with the FOA name and number in the subject line. ARPA-E will not accept or respond to communications received by other means (e.g., fax, telephone, mail, hand delivery). Emails sent to other email addresses will be disregarded.

**Q6. Can a person be PI on one proposal and a co-PI on a second separate proposal?**

**ANSWER:** Yes, but the applications must be scientifically distinct from one another.

**Q7. May applicants submit more than one concept paper to this funding opportunity?**

**ANSWER:** Yes, but each Concept Paper submission must be scientifically distinct.

**Q8. I have developed a technology that may be a good fit for this funding opportunity. Will ARPA-E please review the attached project information and let me know if I should make a submission to this funding opportunity?**

**ANSWER:** No. Applicants must review the Technical Requirements of this funding opportunity announcement to determine if their technology warrants a submission to ARPA-E. See e.g. Section I.D (“Technical Categories of Interest”) and Section I.F (Applications Specifically Not of Interest) of the FOA.

**II. Questions for week ending: OCTOBER 3, 2014**

**Q9. There is a submission deadline discrepancy between FOA-0001197 cover page “November 10, 2014” and FOA page 1 “November 3, 2014”. Please confirm Concept Paper Submission Deadline is November 10, 2014.**

**ANSWER:** The Concept Paper submission deadline is November 10, 2014. ARPA-E issued a modification to the FOA on October 1, 2014 to reflect this information.

**Q10. Can ARPA-E make their LCOE model available for public use? Where can we find it?**

**ANSWER:** The power plant model was used as an internal tool to calculate performance and LCOE. Note that ARPA-E does not require Concept Papers to make use of the model and instead has specified technical targets in Section I.E (Technical Performance Targets), that support the program objectives specified in Section I.C (Program Objectives).

**Q11. What are the assumptions and methodologies for their LCOE model?**

**ANSWER:** The relevant assumptions and methodologies for the ARPA-E LCOE model are included in Section C.2, Techno-economic analysis for Indirect Dry-Cooling System (including the associated references) and in Table 1: “Working parameters used in the derivation of technical performance targets” found in Section E.

**Q12. Is the cost of \$50/kW for insulation cost plus material or component cost only? Does it include operation cost? If it does, what are the key assumptions of electricity cost/kWhr and other assumptions?**

**ANSWER:** The \$50/kW target for Category 1 technologies is for the capital cost of the technology, including all necessary components (insulation, material, etc). As it is a capital cost target, it does not include operating costs. Keep in mind, however, that one of the objectives of the ARID FOA is that technologies developed should result in less than 5% increase in the levelized cost of electricity. See Section I.C (Program Objectives) and Section I.E (Technical Performance Targets) of the FOA. ARPA-E does not prescribe an electricity cost/kWh to use in cost calculations, but it is recommended that concept papers and/or full applications identify and justify any cost assumptions made.

**Q13. We have developed a \*\*\*\* and would like to know if our technology will qualify for ARID funding? Our technology involves an \*\*\*\*. Would this type of solution qualify for ARID consideration?**

**ANSWER:** ARPA-E may not provide a pre-submission assessment regarding the responsiveness of an Applicant's technology or proposed concept. Applicants must review the Technical Categories of Interest specified in Section I.D and Applications Specifically Not of Interest specified in Section I.F of the FOA and independently determine whether their proposed concept warrants a submission to the ARID FOA.

### III. Questions for week ending: OCTOBER 10, 2014

**Q14. A. Would technologies that lead to significant reduction in water loss (> 75% reduction in water loss, compared to present day cooling towers), and have other significant benefits, be considered non-responsive, or are such solutions acceptable to ARPA-E?**

**ANSWER:** ARPA-E may not provide a pre-submission assessment regarding the responsiveness of an Applicant's technology or proposed concept. Applicants must review the Technical Categories of Interest specified in Section I.D and Applications Specifically Not of Interest specified in Section I.F of the FOA and independently determine whether their proposed concept warrants a submission to the ARID FOA.

**Q14.B The same enabling technology can significantly benefit the steam condenser and result in compact, lightweight, low maintenance condensers. Would it be acceptable to propose technology development that affects steam condensers to reduce water losses substantially?**

**ANSWER:** ARPA-E may not provide a pre-submission assessment regarding the responsiveness of an Applicant's technology or proposed concept. Applicants must review the Applications Specifically Not of Interest specified in Section I.F and Technical Categories of Interest specified in Section I.D of the FOA and independently determine whether their proposed concept warrants a submission to the ARID FOA.

**Q15. Is the "COP<sub>cool</sub>" metric (COP<sub>cool</sub> > 2 on page 23) for a single-effect sorption system or will multi-effect systems that meet this metric be considered?**

**ANSWER:** The "COP<sub>cool</sub>" metric applies to all sorption systems, including single and multi-effect systems. Multi-effect systems that meet the relevant technical objectives and targets outlined in the FOA will be considered.

**Q16. I have a question in regards to submission of Concept Papers for the ARID FOA. Can ideas on both Category 1 & 2 be proposed in a single Concept Paper or will such a submission be considered non-responsive? In other words, if we have ideas for both Category 1 and 2 (that may provide an integrated solution) should we submit two Concept Papers?**

**ANSWER:** Please see Section I.D (Technical Categories of Interest) of the FOA. Concepts that include the development of technologies across multiple Categories (such as into 1 and 2, as suggested in this question) may be combined into a single paper or split into two (or more) separate Concept Papers. ARPA-E will not recommend an approach - it is up to the applicant to decide the best way to present their concept(s) to ARPA-E. Note that if the development of technologies across multiple Categories is presented in a single Concept Paper, it will be important that the Concept Paper make reference to and meet technical targets across all relevant categories. The proposer should also consider whether or not the combined system will fit best in Category 3.

#### IV. Questions for week ending: OCTOBER 17, 2014

**Q17. Does this FOA consider solutions that are only applicable to large centralized power production?**

**ANSWER:** No. At a minimum, concepts must be applicable to large centralized power production, but ARPA-E is also interested in those that may also be applicable to smaller, decentralized systems see, Section C.5 of the FOA, Scalability and Modularity for Commercialization.

**Q18. Will making use of non-potable water sources (vs. using freshwater) be considered?**

**ANSWER:** Non-potable sources may be used in the system, but note that the program objective regarding no net water dissipation would still apply. As per the relevant language in Section C of the FOA, Program Objectives: “The ARID program seeks to enable the development of transformational power plant cooling technologies that...dissipate no net water to the atmosphere (note that in cases where water vapor is dissipated to the atmosphere, not including surface water evaporation, an equal or greater amount of water vapor must be captured);” The FOA purposefully refers to general “water” dissipation, rather than “freshwater” dissipation. Thus, dissipation of any water (potable, nonpotable, freshwater, seawater, brackish water, reclaimed water, etc.) in the cooling process is viewed to be the same.

**V. Questions for week ending: OCTOBER 24, 2014**

No new questions received.

**VI. Questions for week ending: OCTOBER 31, 2014**

**Q19. We would like a clarification on the definition of " $COP_{cool}$ " for a Sorption/Desorption system on page 23 of the document. Specifically, what does the term " $Q_{heat,in}$ " include?**

**ANSWER:** Please see ARID FOA Modification 2. The explanation for Section I.E Technical Performance Targets, Subcategory 2A: Sorption/Desorption Cooling System has been updated to clarify  $COP_{cool}$ .

**Q20. Is the cost of \$50/kw for installation cost plus material, or is it only for component cost?**

**ANSWER:** Please refer to Section I.E of the FOA. The description for the \$50/kw target specifies that the target is for “Capital cost of heat exchanger.” Therefore, installation cost should not be included in this calculation.

**Q21.A. In category 2B of the FOA, does the cost requirement of \$150/kWth include the cool storage cost?**

**ANSWER:** Yes, the cost requirement for Category 2B in Section I.E of the FOA includes the cool storage cost. In the explanation for Category 2B: Multimode (Convection/Radiative) Cooling Plus Storage, the FOA states, “The cost includes the cost of the full system. If a proposed concept will use a commercially available storage unit or a storage media that does not require development, it should not be included in the development plan, but should be specified and factored into the cost analysis.”

**Q21.B. Why is the cost requirement (\$150/kWth) the same for Category 2B and Category 2C of the FOA when the cost target for Category 2B is for multimode cooling plus cool storage and the cost target for Category 2C is for a standalone cool storage system?**

**ANSWER:** The cost target for Category 2C is not for a standalone cool storage system. Please refer to Section I.E of the FOA. In the explanation for Category 2C: Cool Storage System, the FOA states, “The cost includes the cost of the full system, including heat exchangers for charging....” Note that in Category 2B, the multimode convection/radiation cooling unit described is a heat exchanger that charges the storage unit. In Category 2C, the heat exchanger is generalized to allow for other technologies. Therefore, Categories 2B and 2C describe equivalent systems and thus have equivalent cost requirements.

**Q22. If we propose an enabling technology for existing direct air-cooled condensers to Category 3, should we consider the cost for our proposed enabling technology only when determining the capital cost of the system?**

**ANSWER:** No. Please refer to Section I.E of the FOA. In the explanation for Category 3, the FOA states, “The cost includes the cost of the full cooling system architecture, including any supplementary cooling systems that might be required. Only the proposed transformative technology should be included in the development plan, but other components and subsystems should be factored into the cost analysis.”

**Q23. Should I provide a quantitative number for the capital cost of the system in the concept paper?**

**ANSWER:** Yes. As stated in Section IV.C., Subsection 2 of the FOA, “To the extent possible, provide quantitative metrics in a table that compares the proposed technology concept to current and emerging technologies and to the technical performance targets in Section I.E of the FOA for the appropriate Technology Category in Section I.D of the FOA.”

**Q24. Would a \*\*\*\* qualify for this funding opportunity?**

**ANSWER:** ARPA-E will consider concepts that propose to meet or exceed the technical performance targets set forth in Section I.E (Technical Performance Targets) of the FOA and do not fall under Section I.F (Applications Specifically Not of Interest) of the FOA. Applicants must review the technical requirements of the FOA and independently determine whether their proposed concept warrants a submission.

**Q25. Can I propose a technology that would not be enabling for power plant cooling systems, but that would result in significant water savings in power production?**

**ANSWER:** Please see the response to questions 13 and 24 above.

**Q26. In subcategory 2b: multimode (convection/radiative) cooling plus storage (page 24) the target metrics include radiative heat flux,  $q'' > 100 \text{ W/m}^2$ . What temperature change from the ambient (i.e.  $\Delta T$ ) does the specified heat flux correspond to?**

**ANSWER:** Please refer to Section I.C.4, subsection “Cool Storage” of the FOA, which states, “A radiative cooling system could be envisioned...assuming 30°C water exiting a heat exchanger. ...The sky temperature is approximately -50°C...the maximum theoretical heat flux is approximately 120 W/m<sup>2</sup>.” From this, 100W/m<sup>2</sup> was chosen as the target.

**Q27. The \$50/kWth capital cost for the cooling tower configuration seems to exclude the capital costs for the steam surface condenser. After adding the cost for the condenser, the total cooling system cost would be higher. Does this change the evaluation and associated targets?**

**ANSWER:** The \$50/kWth in Section I.E of the FOA is the capital cost target for an air-cooled heat exchanger. It is correct that this target does not include the cost of the steam condenser; however, the cost of the steam condenser was included in the techno-economic analysis of the overall cooling system described in Section I.C.2 of the FOA. This techno-economic analysis was used to determine that \$50/kWth capital cost for the air-cooled heat exchanger would support the objectives of the FOA. Therefore, no change will be made to the evaluation criteria nor to the technical targets of the FOA.

**Q28. In regards to Category 3 technical target 3.3 in Section I.E. of the FOA, “Prototype cooling capacity size  $Q_{cool}$ ,” are concept papers required to show that the proposing team will achieve a prototype of this size (20–100 kWth) at the end of the project?**

**ANSWER:** Yes. Concepts proposed under Category 3 in Section I.E. of the FOA must propose a prototype at the following scale:  $Q_{cool} = 20\text{--}100 \text{ kWth}$ . See also Section IV.C. of the FOA for concept paper content requirements.