DE-FOA-0002581 – COOLERCHIPS FOA FAQ

QUESTIONS CAN BE SENT TO ARPA-E-CO@HQ.DOE.GOV

DEADLINE FOR QUESTIONS: 5 PM ET, 10/16/2022

QUESTIONS AND ANSWERS

PLEASE REFER TO THE GENERAL FAQS SECTION OF ARPA-E'S WEBSITE (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. IS A FOREIGN SMALL BUSINESSES WHO HAS A SUBSIDIARY INCORPORATED UNDER THE LAWS OF A STATE OF THE UNITED STATES, ELIGIBLE TO SUBMIT APPLICATION TO THIS FOA (DE-FOA-0002851)?

IF YES, SHOULD THE FOREIGN SMALL BUSINESSES SUBMIT THE APPLICATION, OR SHOULD ITS SUBSIDIARY SUBMIT THE APPLICATION?

ANSWER: Please reference FOA Section III.A.3. Foreign Entities

Q2. WE ARE EXPLORING TO SUBMIT A CONCEPT PAPER FOR DE-FOA-0002851 IN CATEGORY C [REDACTED].

WE HAVE TWO QUESTIONS -

1. **IS IT MANDATORY THAT THIS SOFTWARE NEEDS TO BE OPENSOURCE?**
2. **ALSO IN THE SOLICITATION IT IS MENTIONED THE SOFTWARE NEEDS TO BE UPDATED EVERY 6 MONTHS FOR CATEGORY A AND CATEGORY B? IS THIS REQUIREMENT ENFORCED FROM THE BEGINNING OF THIS PROJECT OR AFTER THE COMPLETION OF THE PROJECT?**

ANSWER:

1. As per DE-FOA-0002851 COOLERCHIPS Funding Opportunity Announcement section 1.D.2, Technical Category C project teams shall make the software developed under the COOLERCHIPS program available under open-source, but it is not mandatory that the base software that it is developed upon be open-source. However, to the extent the software that is developed under an award is a modular add-on that requires access to additional software not available as compatible open source, such additional software is not required to be available as open source but must be generally available to any users of the model.

2. The 6 month requirement between each software update is enforced from the beginning of the project throughout its entire period of performance with ARPA-E. As per DE-FOA-0002851 COOLERCHIPS Funding Opportunity Announcement section 1.D.2, Technical Category C projects are expected to have their basic functionality of energy, reliability, CO2 footprint, and cost analysis modeling capability ready by the first six months. Subsequent releases will have increased fidelity and capability.

Q3. DEAR ARPA-E CONTRACTING OFFICER:

1. IS THE UPCOMING FOA RFI-0000063 FOR NEW PROGRAM FOR DATA CENTER COOLING STILL PART OF THE ARPA-E PROGRAM OR HAS THIS SCOPE BEEN ROLLED INTO THE COOLERCHIPS FOA DE-FOA-0002851 AND FOA-0002852? I NOTE THAT RFI-0000063 REMAINS LISTED ON THE ARPA-E WEBSITE.

2. WHY ARE THERE TWO PROGRAM NUMBERS FOR THE COOLERCHIPS FOA, BOTH HAVE THE SAME TITLE? PLEASE CLARIFY THE DIFFERENCES IN SCOPE.

ANSWER: 1. The RFI-0000063 announcement is a teaming partner list. Please refer to the announcement for guidance on how to use the list or to be added to the teaming partner list.

2. Please refer to the DE-FOA-0002852 COOLERCHIPS SBIR/STTER Funding Opportunity Announcement section 1.B. SBIR/STTR PROGRAM OVERVIEW.

Q4. ON PAGE 15 (1. PROGRAM BOUNDARY AND TECHNICAL CATEGORIES /SCOPE) THE FOA READS "[…] SOLUTIONS FOCUSED ON CHIP DESIGN, INTERNAL CHIP COOLING, […] ARE CONSIDERED OUT OF SCOPE".

THE CONVECTION CONTRIBUTION TO THE JUNCTION-TO-COOLANT THERMAL RESISTANCE IS ASYMPTOTICALLY DECREASING WITH THE HEAT TRANSFER COEFFICIENT FLUID-WALL. CONVERSELY, THE CONDUCTION CONTRIBUTION IS LINEARLY DECREASING WITH THE CONDUCTION THERMAL PATH LENGTH.

THEREFORE, A CHIP CO-DESIGN STRATEGY IN WHICH THE CHIP'S CASE IS NON-METALLIC AND SEAMLESSLY INTEGRATED WITH THE COOLER, WHILE STAYING EXTERNAL TO THE TRANSISTOR NETWORK, WOULD BE ATTRACTIVE FROM BOTH THE COOLING AND COEFFICIENT OF THERMAL EXPANSION PERSPECTIVES.

IS THE CHIP'S _CASE_ REDESIGN OUT OF SCOPE?

ANSWER: Chip design is considered out of scope of the FOA as per Section III.C.3 of the DE-FOA-0002852 Funding Opportunity Announcement. Case or lid modification can be considered package modifications and are allowable.

Q5. MY QUESTION IS ON THE ELIGIBILITY OF COMPANIES SUCH AS COMPANY X TO PARTICIPATE AS PARTNERS (SUBCONTRACTORS TO THE PRIME) SINCE NOT ALL OF OUR SOFTWARE REQUESTED BY THE PRIME FOR THE PROJECT WOULD BE OPEN SOURCE. WE ALSO HAVE SOFTWARE WHICH LINKS TO THIRD PARTY SOFTWARE. OUR SOFTWARE LICENSES ARE NON-EXCLUSIVE AND ANY ENTITY CAN ACCESS THE SOFTWARE UNDER LICENSE (IF NOT UNDER EXPORT COMPLIANCE CONTROL).

ANSWER: See answer for FAQ 2.

Q6. PLEASE FIND THE FOLLOWING QUESTIONS REGARDING THIS FOA:

1. IN SECTION I.D.2 OF THE FOA UNDER TECHNICAL REQUIREMENTS FOR CATEGORY B, THE FOA STATES THAT DESIGNS "…SHOULD NOT ASSUME THE AVAILABILITY OF WATER." IS IT PERMISSIBLE (AND CONSISTENT WITH THE INTENT OF THE FOA REQUIREMENTS) FOR AN APPLICANT'S CONCEPT ASSUME THAT CIVIC WATER INFRASTRUCTURE EXISTS AT THE MODULAR LOCATION (AS WOULD BE EXPECTED IN ANY POPULATED AREA) WITHOUT ANY ACTUAL WATER CONSUMPTION OR USE WITHIN THE DATACENTER?
2. WHAT ARE THE COST SHARE EXPECTATIONS/REQUIREMENTS FOR GOVERNMENT ENTITIES (I.E. STATE AND LOCAL GOVERNMENTS)?
3. WILL THERE BE ANY INFORMATION SAFEGUARDING REQUIREMENTS (E.G., CUI (I.E., CONTROLLED UNCLASSIFIED INFORMATION, CONTROLLED TECHNICAL INFORMATION, COVERED DEFENSE INFORMATION) OR CLASSIFIED (I.E., SECRET, TS, ETC.) TO SUPPORT THE PERIOD OF PERFORMANCE?
4. WILL THERE BE ANY EXPORT CONTROL REQUIREMENTS (E.G., EAR, ITAR)?
5. WILL THERE BE ANY NATURALIZATION RESTRICTIONS (I.E., US CITIZENS OR US PERSONS) REQUIRED TO SUPPORT THE PERIOD OF PERFORMANCE?
6. IS THE COVER SHEET INCLUDED IN THE CONCEPT PAPER PAGE COUNT LIMIT?

ANSWER:

1. As indicated in Section I.D.2 of the DE-FOA-0002852 Funding Opportunity Announcement. the design of solution meeting Category B: "*should operate as stand-alone outdoor units without the need for any external cooling facilities in any US environment*".

2. Please see COOLERCHIPS FOA Section III.B. (Cost Sharing)

3. No, please see COOLERCHIPS FOA Section VIII. (Other Information)

4. No, however, a Prime Recipient of an Award under this FOA will be required to comply with U.S. export control laws and regulations in the performance of work under such Award.

5. No, please see COOLERCHIPS FOA Section III.A.3. Foreign Entities.

6. Yes, the cover sheet is included in the concept paper page count. Please use the Concept Paper template when submitting your application.

Q7. WE PLAN TO SUBMIT OUR PROPOSAL FOR COOLERCHIP FOA – TECHNICAL CATEGORY C (SOFTWARE DEVELOPMENT). PLEASE PROVIDE AN ANSWER THE FOLLOWING TWO QUESTIONS:

1. WHAT ARE POTENTIAL USERS FOR THE OPEN-SOURCE SOFTWARE PLATFORM DEVELOPED FOR COOLERCHIP PROGRAM?
2. HOW DETAILED SHOULD THE TOOL COVER PERFORMANCE MODELING NEEDS FOR VARIOUS COMPONENTS OF A DATA CENTER?

ANSWER:

1. The initial users of the software developed in Technical Category C will be the performers in Technical Categories A and B. The software should be available as an option to be used by these performers to demonstrate that their technologies meet the FOA requirements for energy consumption, reliability and cost. As developed under open-source it is anticipated that the software will be made available to the general public.
2. As indicated in Section I.D.2 of the DE-FOA-0002852 Funding Opportunity Announcement, the modeling software should be available to be used to model and simulate the overall data center energy usage, CO_2 footprint, reliability, and cost of the technologies developed and sufficiently detailed to accomplish this purpose. The software will also calculate operational carbon footprint based on the energy results and suitable carbon emission factors.

Q8. PLEASE FIND THE ATTACHED QUESTIONS THAT WE HAVE PUT TOGETHER ALONG WITH UNIVERSITIES AND INDUSTRIAL TEAM MEMBERS. THESE QUESTIONS ARE RELATED TO THE COOLERCHIPS FUNDING OPPORTUNITY NO. DE-FOA-0002851.

1. **WHAT IS THE TARGETED CHIP JUNCTION OR CASE TEMPERATURE FOR THE FUTURE 1000 W PROCESSORS?**
2. **IT WAS MENTIONED IN THE FOA A CHIP TEMPERATURE OF 70 – 90 °C (PG. 7). IS IT THE CHIP JUNCTION OR THE HEAT SPREADER TEMPERATURE?**
3. **THERE IS NO CURRENT CHIPSET THAT IS 1000 WATTS, SO HOW ARE WE GOING TO TEST REALISTIC SERVER CHIPSETS? IS IT MANDATORY TO USE REALISTIC SERVER CHIPSETS OR TTVS WITH UNIFORM HEATERS THAT CAN BE USED TO TEST THE PROPOSED SOLUTIONS?**
4. **A STATEMENT QUOTED HERE FROM PG.8 OF THE FOA "COOLERCHIPS WILL TARGET A THERMAL RESISTANCE LOW ENOUGH TO ENABLE POTENTIAL FUTURE 1000 W PROCESSORS TO BE COOLED WITH A COOLANT TEMPERATURE OF FEWER THAN 10°C BELOW CASE TEMPERATURE".**

   WHAT WAS MEANT BY SENDING THE COOLANT SUPPLY TEMPERATURE TO CHIP 10 °C BELOW CASE TEMPERATURE, IS CASE TEMPERATURE HERE REFERRED TO JUNCTION OR HEAT SPREADER TEMPERATURE?
5. **CAN YOU PLEASE ELABORATE ON THE FOLLOWING QUOTED STATEMENT FROM THE FOA UNDER TECHNICAL CATEGORY B "SMALLER UNITS CAN BE PROPOSED AS LONG AS THIS VOLUMETRIC POWER DENSITY TARGET AND A MINIMUM OF 100 KW TOTAL COMPUTE POWER" PG.17. IS IT POSSIBLE TO PROTOTYPE AND TEST ON 100 KW POWER AS LONG AS THE 20 KW/M3 POWER DENSITY IS MET?**
6. **CAN WE REQUIRE ACCESS DOORS ALL AROUND THE PERIMETER OF THE "ISO-CONTAINER" SIZED PACKAGE? ALLOWS MORE USE OF INTERIOR SPACE.**
7. **CAN WE REQUIRE THE ISO-CONTAINER TO SIT ATOP DUNNAGE (STEEL FRAME, PROVIDED BY SITE, IN LIEU OF CONCRETE SLAB) TO ALLOW AIRFLOW ETCETERA ACCESS TO UNDERSIDE OF ISO CONTAINER?**
8. **CAN WE HAVE AN INSTALLER ATTACHED DUCTING ETC. TO THE ISO CONTAINER? TYPICAL FIELD INSTALLED TYPE OF DUCTING.**
9. **CAN WE SPECIFY AIR-COOLED OR LIQUID COOLED SERVERS ACCORDING TO OUR BEST DESIGN? CAN WE SPECIFY THE ASHRAE TC9.9 THERMAL CLASSIFICATION (EXAMPLE A4 FOR AIR COOLED) SIMILARLY FOR WATER COOLED?**

10. **CAN FOREIGN ENTITY BE A MEMBER OF A PROJECT TEAM IN CATEGORY A AND B? CAN WE HAVE PARTNERS FROM OUTSIDE THE US?**
11. **WHAT ARE THE LIMITATIONS REGARDING THE MANUFACTURABILITY OF SYSTEM COMPONENTS, IS IT MANDATORY TO BE INSIDE THE USA?**
12. **CAN WE SUBMIT MULTIPLE APPLICATIONS FOR THE SAME TECHNICAL CATEGORY? ON FOA, PG. 5 AND PG. 37, CAN YOU PLEASE ELABORATE ON THE LIMITATIONS ON THE NUMBER OF SUBMISSIONS.**
13. **CAN ANY EQUIPMENT BE PLACED ON THE CONTAINER ROOF?**
14. **IS THERE ANY LIMITATION ON THE CONTAINER Z-DIRECTION?**
15. **CAN WE USE TTVS FOR SYSTEM COMMISSIONING AND LATER PARTIALLY USING REAL SERVER CHIPSETS (CPUS, GPUS) FOR TESTING?**
16. **CAN WE USE A 52U RACK INSTEAD OF THE STANDARD 42U RACK?**
17. **IS THERE ANY LIMITATION ON INSTALLING EQUIPMENT ON THE SIDES OF THE CONTAINER? ANY DIMENSIONS?**
18. **IS IT ADVANTAGEOUS TO BE HIGHER THAN 1 KW/PROCESSOR?**
19. **CAN WE INSTALL ANY COMPONENTS BELOW THE CONTAINER? ANY LIMITATIONS?**
20. **DO WE NEED TO KEEP SPACE FOR HUMAN ACCESSIBILITY? ANY REQUIREMENTS?**

ANSWER:

1. The FOA does not specify a target case or junction temperature for future 1000 W processors. The FOA specifies a target thermal resistance that should be met regardless of case or junction temperature of relevant chipsets identified by the proposal.

2. The FOA specifies a target thermal resistance that should be met regardless of case or junction temperature of relevant chipsets identified by the proposal.

3. Realistic and relevant future chipsets are encouraged to be explored to ensure that relevant solutions are developed. Any test vehicle proposed needs to mimic realistic dynamic chip heat loads with relevant hot spots and non-uniformity as can be anticipated in relevant chipsets. It is not the intent that significant efforts in the projects are used to develop TTSV.

4. The top of the chip whether bare silicon or case.

5. Yes. The ISO 40 shipping container reference volume is a constraint on the maximum volume. Units with lower power and volume may be proposed as long as they meet the power density and minimum power requirements.

6. The ISO 40 container size is meant to be a reference volume, the configuration of the modular unit (including doors) may be specified by authors of the proposal.

7. In general there is no concern on having the modular compute system on a raised legs, however for fair comparison to other proposals, it would be easier to compare if during shipping these are folded or retracted and contained inside the ISO container system.

8. The system must initially fit within the volume of an ISO 40 shipping container for transport. Once on site and deployed, ducting may be installed or extended from the system as long as the ducting initially fit within the system boundary for transport.

9. There are no requirements relating to the server specifics as long as power density can be met.

10. Please see COOLERCHIPS FOA Section III.A.3. (Foreign Entities) and ARPA-E General FAQ 3.1.

11. Please see COOLERCHIPS FOA Section VIII. (Other Information), specifically, the Department of Energy's DETERMINATION OF EXCEPTIONAL CIRCUMSTANCES (DEC) UNDER THE BAYH-DOLE ACT TO FURTHER PROMOTE DOMESTIC MANUFACTURE OF DOE SCIENCE AND ENERGY TECHNOLOGIES. Further, any equipment or supplies acquired under an Award resulting from this FOA must be made or manufactured in the United States, to the maximum extent practicable.

12. Each application must contain only one proposed concept by one team applying to one Technical Category. However, teams may submit multiple applications in the same category if the applications are scientifically distinct, and may submit applications in multiple categories. Individual applicants may participate on multiple teams.

13. The Technical Category B systems must be initially fit within the volume of an ISO 40 shipping container for transport. It is acceptable to have components on the roof if the overall system fits within this constraint. Components may also be placed on the roof or extended from the modular system when deployed on site making the resulting system larger than an ISO 40 shipping container as long as those components fit within the system during transport.

14. The entire system must initially fit within the boundary of an ISO 40 shipping container for transport. This places a boundary on the Z-direction. Once deployed the system volume may exceed that of an ISO 40 shipping container with no constraint on the Z-direction under the condition that the entire system must fit within the ISO 40 shipping container boundary prior to deployment.

15. Realistic and relevant future chipsets are encouraged to be explored to ensure that relevant solutions are developed. Any test vehicle proposed needs to mimic realistic dynamic chip heat loads with relevant hot spots and non-uniformity as can be anticipated in relevant chipsets. It is not the intent that significant efforts in the projects are used to develop TTSV.

16. Yes, a 52U rack may be used as long as power density targets are met.

17. There are no restrictions on installing equipment on the sides of unit. However, all equipment must initially fit within an ISO 40 shipping container for transport prior to being deployed in the field. The final deployed unit may have equipment installed on or extended / deployed from the sides.

18. The FOA does not directly specify chip power, only minimum power density and minimum partial rack power. It is encouraged to look at relevant future chipsets.

19. In general there is no concern on having the modular compute system on a raised legs, however for fair comparison to other proposals, it would be easier to compare if during shipping these are folded or retracted and contained inside the ISO container system.

20. There are no FOA requirements for human accessibility, but proposals need to include realistic maintenance and operation practices that allow for commercial viability.

Q9. WE HAVE THE FOLLOWING QUESTIONS ABOUT THE COOLERCHIPS FOA.

1. WHAT WILL BE THE AVAILABILITY OF THE TEST FACILITIES OFFERED BY TECHNICAL CATEGORY D TO THE PROGRAMS IN TECHNICAL CATEGORIES A/B? WILL THE TEST FACILITIES BE AVAILABLE THROUGHOUT THE PROGRAM, OR ONLY DURING A SHORT TIME WINDOW AT THE END OF THE PROGRAM?
2. WILL TTVS BE AVAILABLE TO TECHNICAL CATEGORIES A/B, OR DO THEY NEED TO SOURCE/CREATE THEIR OWN?
3. REGARDING THE MASS FLOW RATE OF THE FACILITY WATER, IS THERE ANY PROGRAM CONSTRAINT AS TO WHAT CAN BE ASSUMED FOR THE FLOW RATE FOR TECHNICAL CATEGORY A? FOR EXAMPLE, CAN THE FLOW RATE BE INCREASED, AS LONG AS THE INCREASED PUMPING POWER BE INCLUDED IN THE ANALYSIS?
4. DOES THE DESIRE TO HAVE LOWER WATER CONSUMPTION INCLUDE CLOSED-LOOP WATER USAGE?

ANSWER:

1. Technical Category D schedules are not specified in the FOA. The intent is for Technical Category D facilities to be available to the Category A and B teams as early in the program as possible.
2. Realistic and relevant future chipsets are encouraged to be explored to ensure that relevant solutions are developed. It is the Applicant's responsibility to identify these and describe the relevance of their proposed chipset. Any test vehicle proposed needs to mimic realistic dynamic chip heat loads with relevant hot spots and non-uniformity as can be anticipated in relevant chipsets. It is not the intent that significant efforts in the projects are used to develop TTSV.
3. For Category A, teams are to develop a technology for inside the compute room with an energy target of less than 3% of IT_load. In addition, teams are to develop a relevant system that articulates how total heat rejection to ambient can be achieved within 2% of the IT_load. This includes primary cooling loop and any heat rejection to ambient energy. Mass flows and dry cooler dimensions for category A primary cooling loops are to be within conventional energy standards. Relevance and proper sizing of such a system has to be substantiated by references in any proposal.

4. Closed-loop water usage is allowed and not in conflict with a desire to lower operational water consumption..

Q10. THANK YOU FOR THE RESPONSE. PER YOUR RESPONSE BELOW AS I UNDERSTAND THAT IT IS NOT MANDATORY THAT THE BASE SOFTWARE THAT IT IS DEVELOPED UPON BE OPEN-SOURCE BUT MUST BE GENERALLY AVAILABLE TO ANY USERS OF THE MODEL. DOES IT MEAN THE BASE SOFTWARE NEEDS TO BE MADE AVAILABLE TO ALL THE USERS OR ONLY TO THE GRANTEE OF THE DE-FOA-0002851? ALSO, CAN THIS BASE SOFTWARE BE MADE AVAILABLE AS PAID LICENSE TO THE NON-GRANTEE USERS?

YOUR RESPONSE TO OUR PREVIOUS QUESTION: AS PER DE-FOA-0002851 COOLERCHIPS FUNDING OPPORTUNITY ANNOUNCEMENT SECTION 1.D.2, TECHNICAL CATEGORY C PROJECT TEAMS SHALL MAKE THE SOFTWARE DEVELOPED UNDER THE COOLERCHIPS PROGRAM AVAILABLE UNDER OPEN-SOURCE, BUT IT IS NOT MANDATORY THAT THE BASE SOFTWARE THAT IT IS DEVELOPED UPON BE OPEN-SOURCE. HOWEVER, TO THE EXTENT THE SOFTWARE THAT IS DEVELOPED UNDER AN AWARD IS A MODULAR ADDON THAT REQUIRES ACCESS TO ADDITIONAL SOFTWARE NOT AVAILABLE AS COMPATIBLE OPEN SOURCE, SUCH ADDITIONAL SOFTWARE IS NOT REQUIRED TO BE AVAILABLE AS OPEN SOURCE BUT MUST BE GENERALLY AVAILABLE TO ANY USERS OF THE MODEL.

ANSWER: It is not required for base software to be open source, but it has to be generally available. **Generally Available Software** means that the base software is commercially available to any member of the public under a widely accepted non-exclusive license agreement.

Q11. I AM A RESEARCHER FROM [REDACTED]. I AM INTERESTED IN TECHNICAL CATEGORY (TC) B AND WOULD LIKE TO PROPOSE A RESEARCH CONCEPT SIMILAR TO THE 4TH EXAMPLE DESCRIBED IN THE FOA. I PLAN TO REDESIGN THE GEOMETRY OF THE MODULAR DATA CENTER FOR LOW-ENERGY HEAT REJECTION FROM THE INTERNAL COMPUTE SYSTEMS TO THE AMBIENT.

AS STATED IN THE FOA, TC B'S SCOPE IS MUCH LARGER THAN TC A. I HAVE THE FOLLOWING QUESTIONS.

1. **CAN THE PROPOSAL MAINLY FOCUS ON THE BIO-INSPIRED ARCHITECTURAL DESIGN AND AIR MANAGEMENT TO OPTIMIZE HEAT REJECTION IN THE MODULAR DATA CENTER? OR WE ALSO NEED TO COVER THE CRAC SYSTEM DESIGN?**
2. **ALL TARGETS IN TABLE 5 MUST BE MET IN THE PROPOSAL? OR WE CAN JUST PICK THOSE HEAT REJECTION RELATED TARGETS AND USE THE OTHER TARGETS AS BOUNDARY CONDITIONS FOR THE DESIGN OPTIMIZATION?**

ANSWER:

1. Proposals for Technical Category B should be for **complete** modular pod systems. The FOA does not require the use of a CRAC system, but the proposed system must meet the FOA requirements and reject all generated heat to the ambient within the proposed power limits. Performers are encouraged to form multidisciplinary teams to produce complete testable prototypes that meet the FOA specifications.
2. All targets must be met as listed in Table 5.

Q12. I HAVE READ YOUR ANSWER TO Q1 REFERENCING SECTION III.A.3. FOREIGN ENTITIES. HOWEVER, IT WASN'T CLEAR TO ME.
WOULD APPRECIATE IF YOU CAN ANSWER ME WHETHER A FOREIGN SMALL BUSINESSES WHO HAS A SUBSIDIARY INCORPORATED UNDER THE LAWS OF A STATE OF THE UNITED STATES, IS ELIGIBLE TO APPLY TO THIS FOA (DE-FOA-0002851) OR SHOULD IT APPLY TO DE-FOA-0002852?

ANSWER: ARPA-E may not provide pre-submission assessments on a project team's eligibility. Applicants should carefully review the eligibility requirements for the specific FOA to which they intend to submit a Concept Paper or Full Application.

Q13. I WAS WONDERING WHETHER THE IS A MORE SPECIFIC ANNOUNCEMENT RELATED TO THIS CALL ON NEW COOLING TECHNOLOGIES FOR DATA CENTERS.
NAMELY, I WOULD LIKE TO KNOW WHETHER A SYSTEM DESIGN IS ACCEPTABLE, OR DO WE HAVE TO WORK WITH A COMPANY AND MAKE SOMETHING?

ANSWER: The FOA is the definitive document related to this call for new cooling technologies for data centers. Performers in Technical Categories A and B must produce testable systems that can be demonstrated to meet the FOA targets. Performers are encouraged to form multidisciplinary teams to produce testable hardware based on innovative system designs. As per section Section III.C.3 of the DE-FOA-0002852 Funding Opportunity Announcement, paper study alone (i.e. without any hardware development and testing) will be deemed nonresponsive and will not be merit reviewed or considered.