DARPA-PS-25-27 Rads to Watts
Frequently Asked Questions (FAQs)
as of 6/29/25

25Q: Will DARPA allow a single proposal team to submit multiple unit cells, each based on a different material, or must each team propose only one unit cell?

> 25A: Yes, a single proposal team can submit multiple unit cells. With that being said, the proposer team must ensure their plan adheres to the schedule and the metrics expected within that schedule by DARPA. In other words, if the proposal team submits a plan for multiple unit cells, a proposer must consider if they can evolve any one unit cell enough within the allotted time to pass the competitive down-select points. The proposal team is encouraged to submit an abstract in order to receive additional feedback from DARPA.

24Q: Do the tests performed during the first two phases need to directly demonstrate the three performance parameters? For instance, could we use less (uCi) fuel for a longer period of time to reach 10^14 cm^-2? Or could we use a fuel with a lower specific activity (either less pure source or a different species)?

> 24A: The first performance parameter (power density) must be directly demonstrated using a radioactive source of the performer's choosing. The second performance parameter (degradation of that power density after being dosed by the linac) must also be directly demonstrated using your radioactive source of your choosing. The third performance parameter (specific power) can be calculated and inferred from the results of the first two parameters. With respect to what species, Curie content, specific activity, or other considerations, that is up to the proposer to decide in order to meet the metrics as described in the PS (in particular for pages 5-7) and must adhere to the schedule set by DARPA.

23Q: In your size and weight figures of merit (excluding time), the response to Q12 indicates that the full scale system be included in the white paper and proposal. Since the type of power electronics, thermal management system, are highly ConOps (concept of operation) and mission dependent; requiring a full trades study to be made, is there any guidance as to how to limit the application analysis so that resources are not expended on system level optimization?

> 23A: The PS contains guidance on the level of detail needed to satisfactorily address the power density and specific power metrics in the proposal. A proposer must include at least one recommended mission ConOps for the operational system in their proposal, but it is also acceptable to alert DARPA to your range of ideas if you propose to look at different ideas in a trades study in the program. However, the majority of the investment in this program should go towards developing the radiovoltaic unit cells. Your resources should not be all expected on system level optimization. The "bonus period" after month 24 is the only part of the program specifically meant for this purpose.

22Q: Is it expected that the proposer delivers the unit cell with a radioisotope of choice for the 9-month time capsule test? Or will the time capsule be an unirradiated control for the 1e17/cm2 test?

> 22A: We expect a single "capstone" time capsule to be placed to the side for 9 months combined with your chosen source radiation for a continuous period. The capstone time

capsule will be opened after 9 months and examined for degradation effects over real-time. As the PS elaborates, we also expect performers to develop multiple other time-durations (weeks, days, months…) to pre-emptively examine effects on the unit cells over time both in Period 1 and Period 2. The time capsule will not participate in the linac tests. The linac tests are meant to do accelerated lifetime/aging/damage testing of your CGR and CCR, such that (when it's handed back to you) you measure the W/cm2, and tell us how much that performance has degraded by after we've dosed it.

21Q: The BAA states "Payments are triggered by completed performance of observable technical events (milestones).". Please clarify what is implied by "…completed performance of observable technical events," and specifically under what circumstances DARPA will not make payments to performers after they have conducted research toward Milestones. Please also advise specifically whether DARPA will not make payments if: a) metrics are not met at Milestones; or b) Milestones are not met on the specified Program schedule; or c) … for other outcomes.

21A: Milestones represent technically relevant, tangible events/ activities/ accomplishments on the program critical path that would demonstrate program progression to achieve performance metrics to reach program goals. In an OT-P fixed milestone arrangement, this approach involves a fixed sum paid to the performer for executing the agreed-upon work described in the milestone completion criteria. Payments are made for completing specified tasks as negotiated and identified in the milestones and payments section of the OT. Payments are not based specifically on the success of the technology. The value of the milestones should be commensurate with the value the Government receives during that phase of the agreement. Any deviation from the program's schedule and milestones must be coordinated and approved by the Program Manager to be definitized onto the Agreement via a modification.

20Q: Where can I find the solicitation and attachments?

20A: The solicitation (Amendment 1) is posted to SAM.gov: https://sam.gov/opp/bb29898410fa46a7ba52e930b44ebeea/view

19Q: Can we add to the list of milestones or are they fixed?

19A: Proposers are at liberty to propose/schedule additional performer-defined milestones that are structured to work towards completing program goals, as required to meet the specific performance metrics. Proposers may also suggest edits to program's expected milestones as prescribed within the Program Solicitation (PS). Please note that any suggested edits may not be accepted by DARPA.

18Q: Can we use the CFR de minimis rate of 15% if we don't have gov approved rates yet?

18A: Yes, proposers are allowed to use the CFR de minimus rate of 15% to propose or provide actual support documentation to justify other proposed indirect cost rate. The award instrument is an OT-P, and as such, the rate is fixed once Agreement is awarded and not subject to change.

17Q: Does DARPA permit us to use our negotiated F&A rate, or is it limited?

17A: Yes, DARPA permits the use of negotiated F&A rate.

----------↑↑↑New Q/A↑↑↑----------

16Q: Where do the abstracts get sent to?

16A: Please review Attachments A and B for abstract formatting and submission instructions. Abstracts must be submitted per the instructions outlined therein and received by DARPA no later than the due date and time listed in the Overview Information section in the Program Solicitation (PS). Abstracts received after this time and date may not be reviewed. Please visit Proposer Instructions and General Terms and Conditions for instructions on how to submit your abstract through DARPA's Broad Agency Announcement Tool (BAAT).

15Q: Does the proposer need to have found a Transition Partner for this effort?

15A: DARPA will pursue a transition partner for the effort. However, the proposal must include a recommendation for a domain, power level, and operational duration that the radiovoltaic is expected to operate in as described in the PS.

14Q: What if we don't have a radiation source? Can we substitute dose on the radiovoltaic with a high-energy, high-flux particle device such as another linac to measure W/cm^2?

14A: This is not allowed per the structure of the program, because performers will not be able to perform time capsule experiments, and using an idealized radiation source would not meet the intent of the program to develop power sources for operational use. In particular, a performer will not be able to put their unit cell into a "time capsule" at month 15 for the capstone test, which is expected to be encapsulated along with their respective source. If they rely on a device (e.g., a linac) as a substitute for a radiation source, then the linac would have to be running continuously for 9 months at low flux to get the real time degradation effect data. This is not realistic nor is it representative of an operational unit cell.

13Q: Is the development of scintillators in scope?

13A: No. Rads to Watts will only invest in experimentation and development of radiovoltaic hardware.

12Q: How should shielding be considered, in particular when considering mass for the W/kg estimate?

12A: The W/kg estimate should only include the mass of the full-scale, operational system radiovoltaic. You may assume the device is stand-alone in space, not around humans.

11Q: What is the expected level of funding? What size of teams should we aim for?

11A: The level of funding for individual awards will depend on the quality of the proposals received and the availability of funds. Proposers are encouraged to assemble teams that can address the full scope of the challenges presented in the program solicitation and meet and exceed the metrics therein.

10Q: For (1) PIs, (2) Co-PIs and (3) Institutions, how many proposals may each respectively be on?

10A: There is no limit on the number of proposals that a given prime or subcontractor may submit, however, the unique aspects of each approach should be clear, and should explain how performance would be managed to ensure success and potential conflicts of interest would be handled should multiple proposals be selected for award.

9Q: How should proposers reconcile the linac fluence metric, if the proposer plans to use a different source other than a beta (eg, an alpha, gamma, etc.) with respect to a different source's fluence level? Should the proposer also test their own unit cell with alphas at 1E+17/cm^2 of alphas, for example?

9A: The linac test will be an unbiased way to damage and dose all of the materials with a common energy level and fluence of high energy electrons. This is a way to compare radiation degradation for all performers. Then, the performance of the unit cell subject to its own native particles (e.g., an alpha, gamma, etc.) will be captured in a separate metric via the Figure of Merit (FOM). The FOM will capture the performer's own unique, proposed way to reach (i.e., different radiation source types) their chosen power density and time data points within the range specified by DARPA. DARPA recognizes that the "fluence corridor" which has been illustrated in the Proposers Day slides is illustrated for betas, but a similar corridor could be drawn for the same power density and time values for all unit cells, using correlations for different particles. For example, the 1E+17/cm^2 ceiling is likely to correlate to a 1E+13/cm^2 ceiling for alphas for two given unit cells (one using betas at x W/cm^2 and another using alphas that could equal that same x W/cm^2 value).

8Q: What is the procedure for FFRDCs, UARCs, and National Labs to be involved?

8A: Federally Funded Research and Development Centers (FFRDC), University Affiliated Research Centers (UARCs), and Government Entities to include National Laboratories are not eligible to propose to this solicitation as prime contractors. Should prime proposers require national laboratory support for their efforts, to include the provision of radioisotopes, they must clearly define the proposed supporting role of the national lab(s) in their technical proposal and ensure that proposed costs are segregable in the cost proposal, as DARPA will fund those activities separately through those entities' existing agreements should the proposer be selected for funding.

7Q: What data does DARPA require with regards to waste heat during the unit cell tests?

7A: DARPA is interested primarily in radiation degradation and does not expect performers to iterate on improvements to the device to minimize thermal degradation. The "time capsule" at month 15 will be an opportunity to document the effects of heat on the unit cell performance at month 24; but radiation degradation will be the principal metric from this test that will be used to score performers.

6Q: How are performers expected to quantify the W/cm^2 metric using data from the unit cell experiments, taking into consideration that source radiation may be lost with a single layer?

6A: As stated in the PS, assume source collection efficiency is 100% for singular unit cell experiments in order to validate W/cm^2.

5Q: How much flexibility do performers have when proposing the radiation source for the vision system? What is the level of interest in a nuclear reactor as a source versus isotopes?

5A: Proposers have total flexibility when proposing a radiation source in their proposal as long as they are addressing the requirements of the PS. A reactor is an example of a radiation source which could be possible in the vision system. However, performers need to be mindful of the schedule and application constraints of the program. Neutrons and gamma emissions from a reactor will likely be more difficult to capture, convert, and then drive the resultant energy into current in Rads to Watts via a unit cell in the timeframes needed to meet the competitive metrics.

4Q: What quantity of isotope in relation to licensing limits is expected?

4A: DARPA expects that Rads to Watts performers will not be working with or handling an abundance of isotopes whose radioactivity levels will go beyond the licensing limits of the proposers. Unit cells are expected to be small, using small quantities of radioisotopes within licensing limits.

3Q: What are the expectations for performers to acquire radioisotopes?

3A: DARPA expects that performer teams have experience acquiring the radioisotope that they propose to incorporate into their radiovoltaic and/or that performers are able to reach out to radioisotope providers directly to do the procurement directly. Proposers should refer to the PS, for exact language to address this question.

2Q: What is within bounds with regards to solutions to heat for estimating the W/kg metric?

2A: DARPA is allowing performers to creatively suggest ways to manage waste heat for the full-scale operational system and in order to estimate the W/kg specific power metric. For example, efficiency "topping cycles" that allow added ways to generate energy (besides radiovoltiacs) are allowed. However, performers will be competitively down-selected based on the performance of their radiovoltaic as it pertains to the radiovoltaic's Figure of Merit (FOM) described in the PS at each down-select point, which is a value that is measured by the unit cell in experiments. In other words, even if a performer has met the 10 W/kg with creative assumptions on top of their radiovoltaic, if their radiovoltaic's FOM is lower than another performers', then they will not "win" the competition to move onto the next phase.

1Q: Can you elaborate on why the example list of candidate advanced materials was presented; does it refer to a broad class in a more general sense or specific way to harnessing energy?

1A: The examples which listed out candidate advanced materials depict possible, encouraging ideas for charge-carrying, radiation-tolerant solutions that haven't necessarily been applied in radiovoltaics before. The example list of materials is not meant to be exclusive or comprehensive but provide some suggestions to give a sense of the breadth of possible materials of interest to direct energy conversion.