UAS Power Generation Challenge
#nextGENpower

BLUF
The United States Air Force (USAF) is seeking recent technological advancements in the aerospace and automotive industries that can be leveraged to modernize power generation for **large group 4-5 Unmanned Aircraft Systems (UAS)**. Learn about the U.S. Department of Defense (DoD) UAS groups here.

OVERVIEW

A new suite of UAS-specific mechanical-to-electrical power generators will enable the USAF to optimize missions, reduce manufacturing and replacement costs, and simplify maintenance. These power generators should be reimagined in the context of all relevant industries, leveraging modern manufacturing techniques and addressing lifecycle cost implications.

To learn about legacy power generators, review this whitepaper.

The USAF encourages participants in this Challenge to offer technological solutions for experimentation and/or feasibility study, as well as developed solutions. In either case, we're interested in understanding all underlying technologies upon which the solution relies.

OBJECTIVES
The objectives of the **UAS Power Generation Challenge** are threefold:

1. The **primary objective** is to demonstrate the viability of solutions that examine the tradeoff between performance and cost while reducing manufacturing complexity and production lead times.
2. The **secondary objective** is to accelerate technology developments that could lead to operational adoption of advanced capabilities by the U.S. Government.
3. The **third objective** is to build a stronger domestic industry via the development of multiple commercial and government applications for this new suite of power generators.

CONTEXT

The USAF is interested in net-new solutions, enhancements to existing solutions, and/or the development of multi-capable solutions. For this Challenge, the USAF has identified a set of desired capabilities, known as "desirements." Please note that these are not requirements, but are offered simply to clarify USAF needs. Additionally, the list of desirable capabilities provided here should not be considered comprehensive.

DESIREMENTS

In the near term, the goal is to produce a power generator conceptual framework that effectively maximizes the trade space of power, cost, manufacturability, life, reliability, power quality, and weight. The desirements include, but are not limited to:

- Step load: 1 per unit (i.e., "Square" not "Slow Ramp")
- Power quality: at the load
- Regulated DC voltage output: constant; compatible with known military bus voltages
- Ability to manage short circuits and create peak current: yes to both
- Baseline generator system weight: 1 - 2 kW per pound
- Mechanical speed: generate power across a (typically) 2:1 engine shaft speed range
- Current generator cost = between $0.10 (automotive) to $1.50 (status quo) per Watt

Based on internal knowledge and market research conducted with industry and academia, the USAF has assembled an initial set of focus areas to bring structure to the crowdsourcing process for this AFWERX Challenge. Focus areas include, but are not limited to, the following list of desirements.

FOCUS AREAS

1) Power Generator Design(s)

- Simplicity of design, construction, and maintenance to drive down cost
- Manages average and intermittent peak thermal loads
- Manages peak and short circuit electrical current capability
- Capable of demonstrating scalable output power range of 40 kW to 80 kW or higher—continuous power rating

2) Power System Design

- Leverages existing (if available/applicable) commercial parts, components, and systems
- Versatile, modular electric power generation system (EPGS) that includes power electronics conversion and controls
- Energy management and storage
- Leverages digital design tools

3) Manufacturability & Maintainability

- Leverages modern manufacturing technologies and techniques to reduce production complexity, lead times, and cost
- Geared for maintainability vs. a limited life cycle
- Leverages multi-industry manufacturing technologies and capacities
- Identifies the domestic supply chain for critical components
- Built-in-test (BIT) and Prognostics & Health Management (PHM) to enhance maintainability

4) Multi-use Capability

- Provides scalable power levels
- Interoperable, with common interfaces
- Multi-use, multi-industry applications

WHO SHOULD PARTICIPATE

The USAF welcomes involvement from individuals or teams in industry, academia, investing, and government. We encourage working with partners or teams to meet or exceed the evaluation criteria.

What you stand to gain:

- Potential to receive funding for concept development and/or rapid prototyping and prospective further development of your solution within the USAF
- Potential long-term contract or agreement and continuing business relationships with the USAF and other government agencies
- Chance to inform and shape our nation’s elite warfighting capability, positively impacting our Airmen and creating a more resilient and mission-

ready military force
- Opportunity for teaming and technology development
- Potential invitation to attend the Challenge showcase event and network with peers, the USAF and DoD, customers, and other investors
- Official recognition for you and your organization, if selected, through publication on internal and external USAF communication channels

PROCEDURES

The submission and evaluation process evolves over three spirals.

1. Spiral 1: Offerors submit the web form and optional supplemental document. The Government will evaluate solution submissions against the criteria within this Call. Selected offerors will be invited to Spiral 2.
2. Spiral 2: Selected offerors will be invited to discuss their proposed concept/technology/solution and provide additional information. The Government will evaluate oral demonstrations against criteria within this Call. Selected offerors will be invited to submit proposals in Spiral 3.
3. Spiral 3: Offerors whose solution submission and oral demonstration are evaluated and determined to hold sufficient technical merit will be invited to submit a full written proposal. Instructions and evaluation criteria will be provided in the Spiral 3 Request for Commercial Solution Proposal.

SUBMISSION OF SOLUTION FOR SPIRAL 1:

1. Participation in this Challenge requires a completed submission using the afwerxchallenge.com website here.

   The form includes the following fields:
   - **Solution title**: Provide the concise name of your solution.
   - **Executive summary**: Explain your solution in 500 characters or less.
   - **Solution description**: Explain in detail how your solution tackles the stated problem.
   - **Value proposition**: Describe how your solution can benefit the USAF.
   - **Inputs and outputs:** List the inputs and outputs that your solution needs and produces (if applicable) so an integration effort can more easily be defined.
   - **Solution maturity**: Indicate the development stage of your proposed solution, e.g., idea, prototype/experiment, complete application (has been tested and is ready for launch), or commercially available.
   - **Proof of concept:** Can you provide a test or proof of concept (PoC)

for your solution, prior to potential implementation at scale? If yes, provide the timeline required to complete the test or PoC.
- **Implementation**: Provide the timeline required to implement your solution.
- **Keywords**: Specify any descriptive keywords that may be useful for a search related to your solution.

Note:

- It's possible to create a private draft during the submission period by selecting "save as draft." You can edit and then launch the public submission when you're ready.
- Public submissions can be edited until the submission deadline.
- Participants can attach private files that are only made visible to the evaluation team.

2. Solution submissions shall contain the following:
    a. ***Offeror information****:* Provide point of contact name, email address, phone, and address. (This does not count against the five-page limit.)
    b. ***Executive summary***: Provide an executive summary of the technology. (This *does* count against the five-page limit.)
    c. ***Technology concept:*** Show and/or describe how your proposed solution or potential new capabilities fulfill requirements, close capability gaps, or provide potential technological advancements in support of the Challenge mission focus area, with capabilities to aid in observation, orientation, decision, and action across all domains. Describe the unique aspects of your technology and the proposed work as it relates to the applicable Challenge mission focus area, including key attributes such as data sources, automation, user experience, cyber security, and ability to integrate with other systems. Identify whether the effort includes the pilot or demonstration of existing commercial technology (identified as commercially ready and viable technology), or the further development of commercial technology for potential defense application.
    d. ***Feasibility & scalability:*** If development or adaptation is proposed, identify a suggested path to mature the technology. Identify aspects of your proposal, to include data and software, which may be considered proprietary. Identify the ability of the solution to scale rapidly across the USAF and other agencies, and whether the proposed solution can provide a reasonable management approach for technical delivery, schedule, and cost.

e. ***Warfighter impact:*** Provide an assessment of how the solution brings value to the warfighter.

f. ***Offeror responsibility & solution viability:*** Provide a brief overview of the offeror. Provide a summary of current experience, qualifications, and resources, or ability to obtain them in accordance with FAR Part Subpart 9.4, e.g., a summary of the top line (gross sales/revenues) and balance sheet. Provide a summary of product development, manufacturing (if relevant), and logistics strategy to the best extent possible.

g. Data rights assertions for commercial items (if applicable).

h. Identify any intellectual property (IP) in the technology, all relevant owners and licensors, and associated restrictions on Government use.

i. The due date for Spiral 1 is 7/19/2023.

EVALUATION CRITERIA FOR SPIRAL 1:

A designated team of Government personnel will evaluate Challenge submissions to determine which solutions should advance to Spiral 2. The Government will use the following evaluation criteria, giving each item equal importance:

- **Relevance:** Demonstrates alignment with the Challenge purpose and focus areas.
- **Technical merit:** Product/technology works as stated in support of mission objectives and demonstrates feasibility.
- **Innovation:** Demonstrates a novel, unique, or previously underutilized approach when considered against the Government application.
- **Integration potential:** Manufacturability, functionality, and maintainability as part of a system.
- **Scalability:** Meets or exceeds the needs of mission profiles for broad impact across the USAF.
- **Impact:** Expected benefits to the USAF and Airmen.

ORAL DEMONSTRATION CONTENT FOR SPIRAL 2:

Offerors invited to participate in Spiral 2 shall address the following:

a. Expanded details of the potential solution that was provided in the Spiral 1 solution submission.

b. A live demonstration of the potential solution utilizing relevant and/or analogous data.

c. Should the solution require assistance with testing, validation, and/or capacity for scaling within the USAF, identification of the magnitude, type, and scale of assistance required for follow-on activities.

d. Rough order of magnitude (i.e., bottom-line estimated price) of the solution provided in Spiral 1.

e. The solution submission will identify all intellectual property (IP) in the technology, all owners and licensors thereof, and associated restrictions on the Government's use of that IP.

f. The oral brief should be able to address detailed Q&A from DoD stakeholders, including both technical and operational subject matter experts.

g. The purpose of the showcase is to provide networking opportunities with Government/non-Government communities interested in solutions. Information presented will only impact evaluations if content at the showcase is not consistent with content of solution submissions and oral demonstrations.

Each offeror will be allowed a specified amount of time for their oral demonstration. This will include time for Q&A.

EVALUATION CRITERIA FOR SPIRAL 2:

Oral presentation evaluation criteria is listed below, with each item of equal importance.

a. Responsiveness of the solution in addressing the Challenge mission focus areas.

b. The technical merit of the proposed solution adequately addresses the Challenge mission focus area and demonstrates feasibility for the Government to pursue the proposed solution.

c. The Rough Order of Magnitude will be considered for affordability determinations only.

NOTE: Spiral 2 demonstrations may be recorded for Government evaluation purposes.

COMMERCIAL SOLUTION PROPOSAL (CSP) CONTENT AND EVALUATION FOR SPIRAL 3:

Offerors invited to participate in Spiral 3 will be provided a CSP, which will detail instructions to offerors and explain the basis for evaluation. A request for CSP should be issued no later than twelve months after the mission focus area showcase/demonstration event.

WHAT'S NEXT

The submission period opens on 5/31/2023 and ends on 7/19/2023 at 4:59 PM Pacific Time.

- Submissions shall be made at afwerxchallenge.com, and all required fields must be completed in order to be accepted.
- Communication to all successful and unsuccessful Challenge participants will be sent via email.
- The showcase will take place as an online or in-person event. Offerors selected to participate will receive notification via email. Another evaluation will be completed at the showcase via private pitches and public discussions with evaluators on the virtual showcase website.
- All dates are subject to change. We'll communicate any changes via sam.gov and afwerxchallenge.com.

GOVERNMENT CONTRACTING TERMS & CONDITIONS

Future contracting opportunities related to the **UAS Power Generation Challenge** will be posted to any/all Government points of entry such as sam.gov, sbir.gov, afwerxchallenge.com, etc.

- This Call falls under Commercial Solutions Opening (CSO) FA2280-23-S-C001. A copy of the CSO can be obtained by searching for the FA2280-23-S-C001 at sam.gov. This Call and subsequent awards shall comply with all requirements of the CSO.
- In the event of a conflict between information contained on afwerxchallenge.com and the USAF solicitation on sam.gov, the CSO on sam.gov shall control.
- The announcement of AFWERX events, considered to possess high potential

for further efforts, may be made at afwerxchallenge.com. FAR-based contracting instruments, Other Transaction (OT) for Prototype Projects 10 USC 4022, to include follow-on production OTs, and Prize Competitions 15 USC 4025 may support the accomplishment of these events.

- All announcements made at both sam.gov (formerly fbo.gov) and afwerxchallenge.com website(s) are considered to satisfy the reasonable effort to obtain competition per 15 USC 3719 (e) and 10 USC 4022 (b)(2).
- Possibilities exist to work with existing prime contractors on USAF contracts through submissions provided in response to this Challenge.
- All FAR-based actions will follow post-award synopsis procedures per FAR subpart 5.3 accordingly.
- Subject Matter Experts advising the Government team may include firms contracted by other participating DoD branches (U.S. Army, U.S. Marine Corps, U.S. Navy, and U.S. Coast Guard). These firms are contracted to provide advisory and assistance services to the USAF or other DoD branches. These firms are an important supporting element in ongoing efforts; however, they may be asked to provide limited advice on potential solutions. It is the responsibility of participating firms to protect their intellectual property or other proprietary information as necessary.
- Notice to Offeror(s): The Government reserves the right to cancel this open call, either before or after the closing date. If the Government cancels this open call, the Government has no obligation to reimburse an offeror for any costs.
- The submission deadline is noted in the section labeled “What’s Next.” The submission deadline is controlled by the AFWERX Challenge server time and is not dictated by local participant computer time. AFWERX Challenge shall not be held responsible for discrepancies in computer times, delays due to internet connectivity, server performance due to large numbers of participants utilizing the software simultaneously, or other factors outside of AFWERX Challenge’s control. No exceptions will be made for late submissions regardless of the reason. It is advisable to complete submissions well in advance of the submission deadline.
- This Call may result in the award of prototype projects, which include not only commercially available technologies fueled by commercial or strategic investment, but also concept demonstrations, pilots, and agile development activities that can incrementally improve commercial technologies, existing Government-owned capabilities, and/or concepts for broad defense and/or public application(s). The Government reserves the right to award a FAR Part 12 procurement contract or an Other Transaction (OT) under 10 USC 4022 agreement, including prototype and follow-on production, or no contract instrument at all, as a result of this Call. Consistent with 10 USC 4022, awards of

follow-on production contracts must be made through the use of competitive procedures unless the award of an initial OT provides for a follow-on production contract and the OT participant successfully completed the prototype project.

- In accordance with Section 5.8 of the CSO, non-Government advisors may participate in review of the review of submissions. For this Call, non-Government advisors include Collaboration.Ai LLC, theDifference, and Aerospace Business Development Associates, Inc..
- Foreign-owned businesses may independently submit a solution or do so as part of a teaming arrangement with one or more U.S.-owned businesses. Foreign participation is subject to small business and domestic sourcing restrictions and incentives in this CSO, or as may be imposed in the future by the President pursuant to the Defense Production Act, 50 U.S.C. 50 U.S.C. 4501, et. seq., or the Department of the Air Force. The ability of foreign-owned businesses to obtain a contract award or OTA based upon a submission may depend upon the ability of the foreign-owned business to obtain necessary clearances and approvals to obtain proscribed information, and the ability to comply with U.S. laws, regulations, and contractual terms

- This Call is available for decentralized ordering after completion of Spiral 2. Therefore, Government agencies in addition to the initial Government Sponsor Team may execute a contract by following the Spiral 3 process, in accordance with the CSO and Call. Agencies desiring to execute a contract shall contact the CSO issuing office FA2280, AFRL/RGKA, to obtain and complete a Memorandum of Understanding prior to ordering authority being issued.

- Agency-level protests submitted under Spiral 1 or Spiral 2 shall be submitted to Sandi Brubaker, Contracting Officer, at sandi.brubaker@afwerx.af.mil. Agency-level protests submitted in response to Spiral 3 solicitations shall be submitted to the Contracting Officer soliciting and executing the award.