



# United States Department of the Interior

INTERIOR BUSINESS CENTER

Washington, DC 20240

## DEPARTMENT OF INTERIOR

In partnership with

**The Intelligence Advanced Research Projects Activity (IARPA)**



### BROAD AGENCY ANNOUNCEMENT

**Superior Options for Long-life Solar Technologies with Impressive Conversion Efficiencies  
(SOLSTICE)**



**DOI-BAA-SOLSTICE-FY25-01**

**Issued By:**

**The Department of the Interior (DOI), Interior Business Center (IBC) Acquisition  
Services Directorate (AQD)**

**E-Mail: [IARPA\\_DOI\\_SOLSTICE@IBC.DOI.Gov](mailto:IARPA_DOI_SOLSTICE@IBC.DOI.Gov)**

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## GENERAL INFORMATION

This notice constitutes a Broad Agency Announcement (BAA) and sets forth research of interest in the area of solar-powered energy conversion systems. The solicitation process will follow Federal Acquisition Regulation (FAR) Part 35, Research and Development Contracting, as supplemented with additional information included in this notice. Awards based on responses to this BAA will be considered the result of full and open competition.

1. **Federal Sponsoring Agency Name:** Office of the Director of National Intelligence (ODNI)/Intelligence Advanced Research Projects Activity (IARPA)
2. **Federal Contracting Office Responsible for this BAA:** Department of the Interior (DOI), Interior Business Center (IBC), Acquisition Services Directorate (AQD)
3. **Funding Opportunity Title -** Superior Options for Long-life Solar Technologies with Impressive Conversion Efficiencies (SOLSTICE) Program
4. **Announcement type:** Initial
5. **Funding opportunity number:** DOI-BAA-SOLSTICE-FY25-01
6. **Catalog of Federal Domestic Assistance Numbers (CFDA):** Not applicable
7. **Questions:** Submit questions on administrative, technical, or contractual issues by email to [IARPA\\_DOI\\_SOLSTICE@IBC.DOI.Gov](mailto:IARPA_DOI_SOLSTICE@IBC.DOI.Gov), [Frank\\_Kennedy@ibc.doi.gov](mailto:Frank_Kennedy@ibc.doi.gov), and [Brian\\_Kehoe@ibc.doi.gov](mailto:Brian_Kehoe@ibc.doi.gov).

All requests must include the full name and affiliation of a point of contact. Do not send questions with proprietary content. A consolidated Question and Answer response will be posted on SAM.gov for Contract Opportunities website (<https://SAM.gov/>) and linked from the IARPA website (<https://www.iarpa.gov/research-programs/solstice>). No answer will go directly to the submitter. **IARPA will accept questions until November 12, 2024.**

8. **Dates**
  - 8.1. **BAA Posting Date: October 28, 2024**
  - 8.2. **Questions Due: November 12, 2024**
  - 8.3. **Questions/Answers Amendment: November 27, 2024**
  - 8.4. **White Papers Due: December 9, 2024** (Offerors are strongly encouraged to submit white papers before submitting a proposal.)
  - 8.5. **White Paper Notification: December 27, 2024**
  - 8.6. **Proposal Due Date for Volume 1 Technical/Management Proposal: January 27, 2025**
  - 8.7. **Offeror Notification: April 27, 2025**
9. **Anticipated individual awards** – Multiple awards anticipated.

**10. Anticipated Contract Type – Cost Reimbursement (CR) and Cost-Plus Fixed-Fee (CPFF))<sup>1</sup>**

**Note:** The Government’s preferred contract types are CPFF and CR, however Firm-Fixed Price (FFP) type contract will be accepted under certain situations that do not meet FAR requirements for cost-type contracting, e.g. Offerors that do not have approved accounting systems.

All awarded contracts must meet the Contracting Officer’s fair and reasonable determination prior to any contract award. Fair and reasonable is defined as the price that a prudent businessperson would pay for an item or service under competitive market conditions, given a reasonable knowledge of the marketplace. Regardless of the precise definition, the FAR clearly establishes the need for determining a price to be fair and reasonable price before a Government contracting officer may award contracts.

**11. DOI IBC AQD Contracting Office Points of Contact**

Mr. Frank Kennedy  
Contracting Officer DOI/IBC/AQD  
E-Mail: [Frank\\_Kennedy@ibc.doi.gov](mailto:Frank_Kennedy@ibc.doi.gov)

Mr. Brian Kehoe  
Contracting Officer DOI/IBC/AQD  
E-Mail: [Brian\\_Kehoe@ibc.doi.gov](mailto:Brian_Kehoe@ibc.doi.gov)

**12. Program Manager (PM)**

Dr. Brian Borak  
ATTN: DOI-BAA-SOLSTICE-FY25-01  
Office of the Director of National Intelligence  
Intelligence Advanced Research Projects Activity  
Washington, DC 20511

**13. Program Website –**<https://www.iarpa.gov/research-programs/solstice>

**14. BAA Summary –** The SOLSTICE program aims to develop novel solar-powered and hybrid solar-powered systems with significantly higher power density than existing technologies. The SOLSTICE program consists of the following two (2) Technical Tracks:

**Track 1 Space-based Energy Conversion Systems:** aims to demonstrate improvements over state-of-the art Photovoltaic (PV) energy conversion systems deployed in space.

**Track 2 Terrestrial surface-based Energy Conversion Systems:** aims to demonstrate improvements over-state-of-the art PV power systems deployed in remote terrestrial surface locations.

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<sup>1</sup> **Contract:** This is a standard government contract that follows the processes, format and terms and conditions as outlined in the Federal Acquisition Regulations (FAR) and supplementing Agency specific regulations.

Offerors are strongly encouraged to submit a White Paper so the Government can indicate whether proposed solutions align with the goals of Track 1 or 2. White Papers are not required to submit a technical proposal, however, Offerors that did not submit a White Paper and Offerors that submitted a White Paper but were not encouraged to submit a proposal, may not be given the same priority as Offerors that were encouraged to submit a proposal. (see BAA Sections 4 and 5) Offerors must include a solution for selected Track(s) for all three Phases of the SOLSTICE program (see below).

No research proposals involving human or animal subjects are anticipated under this BAA.

**Anticipated Contract Period of Performance (PoP):**

<b>Contract Period of Performance</b>	<b>BAA Technical Tracks</b>		<b>*POP</b>
Base Period, Phase I	Track1	Track2	18 Months
Option Period, Phase II	Track1	Track2	18 Months
Option Period, Phase III	Track1	Track2	12 Months
Total Contract Period of Performance			48 Months

**Offerors are expected to execute all of Technical Track 1 or all of Technical Track 2, or both and provide fully separate independent proposals and within the PoP of each Contract and Phase PoP.**

\*These dates are estimated subject to change once contract(s) are awarded.

**SAM.GOV Assistance Listings:** Not applicable

**Electronic Mail:** Any questions pertaining to this BAA must be e-mailed to the following e-mail address: [IARPA\\_DOI\\_SOLSTICE@IBC.DOI.Gov](mailto:IARPA_DOI_SOLSTICE@IBC.DOI.Gov), [frank\\_kennedy@ibc.doi.gov](mailto:frank_kennedy@ibc.doi.gov), and [brian\\_kehoe@ibc.doi.gov](mailto:brian_kehoe@ibc.doi.gov).

All e-mails must include the name of the Offerors’ organization and the full name, valid e-mail address and phone number of the Offerors’ point of contact (POC). Do not send questions with proprietary content. If applicable, a consolidated Question(s) and Answer(s) response will be posted on SAM.gov for Contract Opportunities website (<https://SAM.gov/>) and linked from the IARPA website (<https://www.iarpa.gov/research-programs/solstice>): No answers will be provided directly to the submitter.

<b>Milestone</b>	<b>Timeframe Calendar Days (Estimated from day 0)</b>
BAA Posting	Day 0
Questions Due	15+ days (5:00 p.m. ET)
Answers Posted	30+ days
White Paper Due	40+ days
White Paper Feed-Back	60+ days
Volume 1 Proposal Submission (Technical/Management)	90+ days (5:00 p.m. ET)

Offeror Notification (Selected Offerors for Negotiations)	180+ days (5:00 p.m. ET)
Volume 2 Proposal Submission (Cost/Price)	195+ days (5:00 p.m. ET)
Contract Award	354-415+ days

**BAA Estimated Timeline\*:**

**\*the number of days associated with each milestone is only a best estimate. The timeline may be either earlier or later than the estimated number of days.**



## **SECTION 1: FUNDING OPPORTUNITY DESCRIPTION**

IARPA often selects its research efforts through the Broad Agency Announcement (BAA) process. The use of a BAA solicitation allows a wide range of innovative ideas and concepts. The BAA will appear under Contract Opportunities on <https://sam.gov> and a link will be placed on the IARPA website at <https://iarpa.gov>. The following information is for those wishing to respond to this Program BAA.

This BAA is issued in accordance with the Federal Acquisition Regulation (FAR) 6.102(d)(2), which provides for the competitive selection of basic and applied research and that part of development not related to the development of a specific system or hardware procurement. Proposals submitted in response to this BAA that are selected for award are to be in full compliance with Provisions of Public Law 98-369, “The Competition in Contracting Act” of 1984 and subsequent amendments. IARPA is seeking innovative solutions for highly efficient and resilient solar-powered systems to support Intelligence Community (IC) applications in space (Track 1) and terrestrial surface (Track 2) environments.

### **1.A. Program Background**

The Intelligence Community routinely relies upon a variety of stand-alone electronic assets deployed for remote applications. The power systems onboard these devices are essential to ensure mission success. However, remote devices are often subjected to challenging environmental conditions in space and on the earth (land or water) that degrade or limit power system performance. Power density, weight, and volume are all significant factors that affect the range of possible onboard devices that can be supported by the power system. Some desired higher-power payloads may simply be impractical to implement or must be duty-cycled due to power system limitations. The focus of the SOLSTICE program is to enhance power system-level efficiency and resiliency in the challenging environments in which they are placed to yield significantly more energy for the same size, weight, and area of the power system.

Solar photovoltaic (PV) energy conversion technologies have a long heritage of supporting many remote platforms in all the aforementioned environments. PV cells and modules of different efficiency levels can be tailored for a variety of settings and in a variety of form factors. These are largely commoditized products used across the IC, DoD, and commercial applications alike. Despite the plethora of available options, power and energy needs onboard remote platforms continue to grow. Simply adding additional solar modules to address these needs adds more bulk to the system that complicates transportation, deployment, and/or unobtrusive operation in the target environment. High efficiency (multijunction) solar cell systems, currently used almost exclusively for space, are available from a small number of suppliers and can achieve high conversion efficiencies (~30-33%) at the cell level. However, once typical operating conditions (i.e. varying irradiance, temperature), power conversion, and system level losses are accounted for, the realized time-weighted efficiency is substantially reduced, limiting available power and energy. Other potential high-power technologies, such as fuel cells and radioisotope thermoelectric generators (RTGs), may be useful in some scenarios, but lack some of solar PV’s key advantages, namely, high modularity, low weight, low noise, safety, and predictable failure modes. The IC needs power systems with a) high energy harvesting yield (EHY) over a mission lifetime, b) high power density per unit of collection area, c) resilience against environmental stressors and human-made physical threats, and d) ease of transportability and deployment.

## 1.B. Program Overview

The SOLSTICE program aims to deliver revolutionary advances in ultra-efficient and resilient energy conversion systems (power systems) for application in space (Track 1) or terrestrial surface environments (Track 2). Power systems must use solar energy as an input alone, or, in tandem with other sources available in the surrounding environment. System level performance outcome amid the myriad of changing environmental conditions will be the focus of SOLSTICE. It is expected that significant innovations will be required across a wide range of system components and/or the overarching system design architecture to achieve program technical performance metrics. Approaches that achieve the aforementioned goals and also maximize domestic manufacture and minimize the vulnerabilities in component supply chains are highly encouraged. SOLSTICE requirements suggest the need for cross-collaboration and co-design among Research and Development (R&D) teams to access best of breed talent across the wide range of technical disciplines involved and is therefore highly encouraged. Detailed information about specific goals, objectives, metrics, and milestones can be found in the subsequent sections of this BAA.

SOLSTICE will be structured into three phases. Phase 1 (“Proof of Concept (POC) Development”) will last 18 months during which teams will demonstrate proofs of concept for novel high-risk components and/or integrations of their proposed system design. Performance of these POC demonstrations will be incorporated into system-level models (effectively a “digital twin” of a prototype power system) developed by the Performer and transferred to the SOLSTICE Testing and Evaluation (T&E) partner for evaluation and input into a range of orbital or terrestrial performance models that will be used across SOLSTICE. Phase I deliverables will include test articles of the novel components and/or integrations as well as conceptual system designs and modeling/calculations extrapolating performance across the set of conditions possible in the target environment(s). Phase 2 (“Prototype Demonstration”) will last 18 months during which teams will assemble a first-generation technology demonstration prototype power system (PPS) combining components proposed by Performers and approved by IARPA in the end of Phase I design plans. Phase 2 will include several PPS test articles (defined in Section 1.E) along with design and modeling work delivered to the SOLSTICE T&E partners for evaluation. Phase 3 (“Scalability and Durability Assessment”) will last 12 months. Phase 3 Performers will iterate their PPS design based on Phase 2 lessons learned and demonstrate a higher-power-output PPS that may take advantage of a larger collection area. These PPS Test Articles will also undergo preliminary durability and resilience testing to assess reliability in the target environments. By the end of Phase 3, the program aims to demonstrate ultra efficient and resilient PPSs with proven initial designs that show viability for transition and continued development with IC partners.

## 1.C. Technical Approach

Power systems proposed to the SOLSTICE program will need to exhibit the following primary and secondary objectives (see Section 1.F for specific metrics):

Primary Objectives:

- High time-weighted system level energy conversion efficiency ( $\eta_{\text{sys}}$ ), resulting in high mission lifetime energy harvesting yield (kWh);
- High system aperture (collection) area power density ( $W_{\text{mp}}/\text{m}^2$ );
- High stowed system volumetric power density ( $\text{kW}_{\text{mp}}/\text{m}^3$ ) for launch and/or transport;

- A reasonably high peak power output ( $W_{mp}$ );
- High system specific power density ( $W_{mp}/kg$ );
- Minimal power output decay over time resulting from environmental conditions and single damage events including physical impact and/or momentary high flux (~100-500 suns) irradiation incidents
- Capacity to supply power across a range of irradiance and load profiles relevant to each Track

#### Secondary Objectives:

- Reasonable expectation to scale to scale to 10W, 100W, 1kW, 10kW, 100kW power output
- Capable of future integration with appropriate deployment mechanisms for end use cases requiring deployment from an initial reduced-volume state
- Low risk, low cost, domestic manufacturability
- Effective repurposing of thermal waste energy (i.e. temperature regulation, conversion)

In space environments, five-year minimum lifetimes are assumed (stretch target of ten-years) with deployment achieved from an existing launch vehicle. In terrestrial environments, three-year lifetimes are assumed (stretch target of 10-years) with deployment occurring autonomously onto land or water.

To achieve the goals and metrics of the SOLSTICE program (detailed in Section 1.F of this BAA), Offerors will develop systems of co-optimized components that leverage recent and emerging technologies in, for example, solar cells and hybrid power-generation approaches, optics, thermal management, power electronics, and other enabling components to yield power system solutions with unprecedented performance. Concepts could include new 1-sun PV devices, (micro)concentrated solar PV, hybridization of PV with alternative energy conversion or storage devices (e.g. thermoelectric, thermoradiative), innovative power electronics (e.g. photonic transformers, highly discretized power optimization), tunable/adaptive optical materials (thermochromics, electrochromics, metalens optics), new thermal management/storage strategies (e.g. phase change materials, heat pipes, thermal valves), and other solutions that optimize the conversion of sunlight and other energy capturable from the local environment into electricity. Offerors may propose any combination of innovative approaches and/or components to realistically achieve the metrics of the program. Novel approaches towards the design and modeling of materials, components, and/or systems (e.g. potentially leveraging machine-learning, artificial intelligence algorithms) are encouraged. Multidisciplinary teams are expected to achieve the ultimate systems-level optimization sought in the SOLSTICE program. While component development is a key part of earlier phases of the Program, exclusive focus on component technology in the absence of a system level approach toward meeting the SOLSTICE program targets is out of scope. SOLSTICE specifically seeks approaches that leverage co-design of components as part of a holistic system design that maximizes energy harvesting yield and resilience over the course of a mission. Innovations may involve, but are not limited to, the following areas:

#### **Solar Cells and Hybrid Power-generation Structures**

Solutions may leverage novel photovoltaic and other photoresponsive materials, cell architectures, and other supporting components to maximize the energy conversion and collection density and/or energy harvesting yield over time from the light aperture area and other portions of the device. Solar cells could be designed for 1-sun or part of a concentrated solar system. Innovations in multijunction and tandem solar cell photoactive materials, device structures, form factors/size, contacts, substrates, coatings, and encapsulation may contribute to increased overall efficiency, durability, and/or

manufacturability. New materials or approaches to capture and convert unutilized or poorly converted portions of the solar spectrum to contribute more towards the overall cell, module, or system efficiency could also help deliver the performance required to meet the SOLSTICE program metrics. Devices with improved low-light and/or variable spectrum performance could enhance a system's energy harvesting yield over a mission. The above approaches could be synergistic with some Thermal Management and Power Electronics solutions (see subsections below) to realize higher power or energy densities. Other approaches that leverage conditions of the local environment to convert or store additional energy may boost the mission lifetime energy harvesting yield. New fabrication methods for components and structures may produce higher performance, greater yield, and/or lower costs than existing methods.

## **Optics**

The efficient capture and direction of light is essential to ensure high collection efficiency, as is the protection of sensitive materials and systems that carry out the photoconversion. Concentrating optics are a known way to improve power density while offering additional protection for the underlying solar cells. Thus far, concentrating optics designs have proven difficult to implement practically due in part to the optical efficiency limitations, sun-pointing angle of acceptance restrictions, thermal management, cost, and deployment challenges that are imposed. However, new approaches to deliver a modest amount of concentrated light to solar absorbers (potentially including micro-concentrators, adaptive optics, spectrum-splitting optics, non-mechanical sun tracking) with low-profile designs that can achieve good sun tracking and be deployable may present options that can achieve the SOLSTICE targets. Robust coatings and protective layers that can maintain high optical efficiency of light collection over time while protecting against environmental stressors (e.g. proton or electron radiation in space, moisture and soiling/abrasion on the earth surface) could support the lifetime energy harvesting yield of power systems in SOLSTICE.

## **Thermal Management**

Approaches to properly manage, use, store, and/or reject heat may be important to optimize long-term stability and improve overall performance amid changing environmental conditions. Novel components introduced in other parts of a SOLSTICE system may cause greater localized heating (e.g. concentrators) which may be able to reduce power needs elsewhere on a spacecraft or terrestrial platform. Approaches that can convert waste heat into useful work or energy could add to the overall annual energy harvesting yield and power density of the power system and/or reduce the heat rejection temperature of waste heat. These approaches could also reduce the impact of "dark cycles" of the power system when sunlight is not available which can place greater demands on the energy storage system. Macro or micro-scale thermoelectric devices, thermoradiative cells, and thermal energy storage components may offer some opportunities. Coatings, substrates, and other materials that can adapt to changing thermal conditions (e.g. thermochromics) or other stimuli could aid with temporal control of heat flow towards more optimal performance of components and the system as a whole.

## **Power Electronics**

Solutions may leverage a number of potential strategies to convert energy into electricity useable by the remote platform, including but not limited to, traditional centrally organized or highly distributed (i.e. on-wafer cell/subcell-level) power electronic topologies. New approaches and components could improve long-term Energy Harvested Yield by limiting or slowing failure due to environmental and human-created stressors and/or single-event failure modes in the power electronics. By limiting the scope or rate of damage or degradation to key power-conversion components, higher overall lifetime

energy harvesting yields at the system level could be realized, even if some portions of the power-conversion system are beyond recovery. These solutions may also result in efficiency improvements in aggregate in circumstances when light absorption is non-optimal (e.g. partial array shading, obstructions, damage, soiling, changing incidence angle) or when other inhomogeneities of the energy collection components are present (e.g. variable temperature, single-cell failures). Approaches to better manage the flow of energy (electrical, thermal, or otherwise), transiently store energy, or otherwise support an energy management system could yield overall efficiency improvements.

### **Novel Deployment and Survivability Approaches**

New approaches toward packing/deploying solar arrays, optics, and other portions of the power system may result in greater stowed volumetric power densities that can achieve the SOLSTICE targets. Methods to stow and protect the aperture area during threatening periods from environmental and/or human-made physical threats could help maximize the lifetime energy yield of the power system. Autonomous or remotely triggered restorative procedures that repair or regenerate damaged or degraded components could prolong the useful life and mitigate risk. Materials that “self-heal” or otherwise offer greater resilience to the stressors of their environment could also offer promise.

The above-stated components and approaches are examples of the types of innovations sought in this BAA, but potential Offerors should not feel limited to these categories. Any component level or system level innovations or approaches that will aid in reaching the SOLSTICE program targets will be considered. While solutions proposed to SOLSTICE may include many of the aforementioned innovative components to achieve higher lifetime energy harvesting yield and power density, consideration must be made towards the deployment challenges that may be imposed by novel approaches in the target environment. When appropriately scaled and integrated with necessary autonomous deployment components (not within the scope of this program), power systems destined for space must be able to pack within a launch vehicle, survive launch conditions, and be reliably deployed once in space. Similarly, remote systems intended to be deployed on land or water must start in a reduced-volume packed state and successfully deploy once they reach their target location.

Energy storage is an integral part of a remote power system and SOLSTICE will largely leverage established and high TRL energy storage component technology (e.g. electrochemical cells, supercapacitors, thermal energy storage). Battery cells, packs, and/or other energy storage technologies proposed to be incorporated into a SOLSTICE power system need not be commercially available off the shelf (COTS) components, but must be sourced from a fabricator/supplier that can provide a specification sheet with accurate, reproducible performance metrics (+/- 10%) that include form factor description, capacity, cycle life, discharge, charge and temperature range performance specifications. The development of novel energy storage chemistries/materials and sub-cell components (i.e. anode, cathode, separator, electrolyte) without standardized performance is out of scope. However, novel approaches to, for example, support, orient, structure, allocate, manage, and/or control largely demonstrated energy storage components in the context of an overarching SOLSTICE power system design will be considered.

## **1.D. Program Description and Structure**

### **1.D.1 Program Goals**

The SOLSTICE program will pursue two research tracks that target power system development for application in an earth-orbital environment, such as satellite systems (Track 1), and land or water-based application, such as land surface or buoy-mounted devices (Track 2). The power system solutions to be

developed could be used for a wide variety of applications in each target environment; no particular form factor is specified nor are any particular devices to be powered envisaged. Several experimental load/behavior profiles are provided (see Figure 1 in the Test & Evaluation section) to help inform system design. The load profiles are designed to provide measurable comparative data to the program that could map to potential use cases or serve as a basis to compare performer systems against performance targets. The first load profile in Figure 1 (Load 1) will serve as a focal point for testing and Offerors should consider how their system could continue to drive towards higher power levels for longer periods of time in balance with other technical metrics. **While Performer PPS system performance is expected to be measured against each of these load profiles, Offerors are not required to illustrate that their system will serve every load profile.** These profiles are provided as potential examples only and may change for the actual T&E events. Additionally, a pathway towards scaling the proposed power systems from the Test Article demonstrations required at the Phase 2 and 3 test events to successively higher orders of magnitude generating capacity (i.e. 100 W, 1 kW, 10 kW, 100 kW) should be plausible and described by Offerors along with changes in scaling laws and other system design assumptions to include the identification and characterization of risks. Offerors may propose optional work to supplement their main proposal work that addresses design issues in scaling to the aforementioned power output levels which may be funded at the discretion of the SOLSTICE PM. Offerors may propose to a single track or to both tracks separately with two separate proposals. Should Offerors who propose to both tracks be selected for an award in both tracks, those Performers shall be required to submit test articles in the numbers specified in Section 1.E “Testing & Evaluation” to support separate testing and evaluation (T&E) for each track.

Specific goals of the two tracks are as follows:

### **Track 1: Space-based Energy Conversion Systems**

1. Primary and secondary objectives detailed above, for systems located in a space environment under AM0 incident sunlight<sup>2</sup>;
2. A substantially higher lifetime energy harvesting yield (kWh), power density, and degradation resistance over a simulated **5-year** mission (stretch target of 10-years) compared to a SOA system;
3. Reasonable expectation to survive autonomous launch/deployment from a reduced-volume (stowed) state;
4. Comparable cost to SOA 1-sun multijunction space PV systems.

### **Track 2: Terrestrial surface-based Energy Conversion Systems**

1. Primary and secondary objectives detailed above, for systems located in a variety of terrestrial locations under AM1.5 incident sunlight<sup>3</sup>;
2. A substantially higher lifetime energy harvesting yield (kWh), power density ( $W/m^2$ ), and degradation resistance over a simulated **3-year** mission (stretch target of 10-years) compared to a SOA system;
3. Reasonable expectation to survive autonomous deployment from a reduced-volume (stowed) state;
4. Comparable cost to notional 1-sun multijunction terrestrial PV systems.

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<sup>2</sup> AM0 = Air Mass 0 average spectral irradiance typically experienced in an earth-orbital environment with 1366  $W/m^2$  total incident power

<sup>3</sup> AM1.5 = Air Mass 1.5 standard spectral irradiance typical at the earth surface with 1000  $W/m^2$  total incident power

Both Track 1 and Track 2 system solutions must demonstrate performance under simulated environmental conditions, as well as achievement of other metrics specified in Section 1.F Program Metrics.

## **1.D.2 Program Structure**

The SOLSTICE program will proceed in three phases as follows:

### **Phase 1 (18 months) Proof of Concept Development (POC)**

The objective of Phase 1 “Proof of Concept Development” (POC) is to demonstrate new materials, devices, and other component technologies or key integrations for power systems that, with further development and integration into a prototype power system, could allow the system to meet the Track 1 or Track 2 performance metrics shown in Section 1.F of this BAA. For Phase 1, demonstration deliverables must be “self-contained”, meaning they must allow IARPA to perform independent testing and evaluation (T&E) to measure performance, under solar-simulated light or other specified conditions, towards the Program Metrics set for Phase 1. Offerors are free to propose any number of innovative component developments that can realistically achieve the program metrics. Several innovative components may also be combined into a single demonstration unit that can be delivered as a Test Article for T&E. An innovative component is generally considered to be one that has not been previously designed or reduced to practice.

In addition to delivering proof of concept solutions for T&E, Performers must deliver preliminary design documents and modeling to demonstrate that the novel components, when integrated into the proposed power system design (intended for development later in the Program), can be expected to meet all Phase 1 metrics. The mathematical models must describe how the new components will contribute to achieving the Program Metrics in Phase 1 as part of the power system planned for Phase 2, detailing key assumptions and extrapolations, and considering effects not replicable with the Test Articles submitted to the T&E partners. (e.g. thermal management, lower losses due to higher system voltages, scaling effects, etc.)

At the conclusion of Phase 1, Performers must also make a compelling argument, supported by extrapolations from experimental data and modeling, that their power system design (with any substantiated revisions) can reasonably be expected to meet or exceed Phase 3 metrics with further development by the end of the program.

### **Phase 2 (18 months) Prototype Demonstration**

In Phase 2, Performers will improve upon materials, devices, and designs developed in Phase 1 to fabricate a fully integrated prototype power system (PPS). Performers will assemble their PPSs within a standardized set of Power System Testbed (PST) guidelines described in Section 1.E and finalized in the T&E Procedures Manual. The principal Deliverables for Phase 2 will be 1) several hardware PPSs, 2) modeling/simulations of system behavior, and 3) design documents from each Performer for T&E. PPSs will undergo substantial performance characterization under a range of operating conditions anticipated in target environment(s). Performance will be compared to reference PPSs assembled by the T&E team using best-available components. Experimentally derived performance parameters will be fed into standardized models assembled by the T&E team to calculate time-weighted system energy efficiency ( $\eta_{sys}$ ) and energy harvesting yield (EHY). In addition to the PPS hardware, Performers must deliver updated component-level and system models/simulations that will be compared with T&E modeling/simulation. Performers must also develop a strategy and deliver supporting documentation on how their power system will scale beyond the Phase 2 PPS system size to include larger aperture area.

Performers must provide a clear description of how the power system will mature to meet the required metrics for Phase 3 of the program and higher-scaled system sizes. PPSs have no specific voltage, current, or mass requirement, provided the integrated components fit within the volume of the PST form factor and meet the interface requirements as defined by the T&E teams.

### **Phase 3 (12 months) Scalability and Durability Assessment**

In Phase 3, Performers will refine and scale their power systems to meet Phase 3 metrics. While Phases 1 and 2 do not specify a target output voltage to facilitate innovation, Phase 3 PPSs are anticipated to meet a specific voltage requirement that will be determined during the earlier phases of the program, to facilitate near-term end use. Performers will continue to leverage the standardized PST form factor used in Phase 2 and update their PPS design with improved components and/or approaches to achieve the end of Phase 3 metrics. These PPSs will be sent to the T&E team for performance and durability evaluation. Durability tests will include testing against potential failure modes and conditions that could be expected in the target environment(s).

#### **1.D.3 Team Expertise**

Collaborative efforts and teaming among Offerors are highly encouraged. It is anticipated that teams will be multidisciplinary, leveraging expertise, capabilities, and innovations under development from a range of entities. IARPA anticipates that Offeror teams may include, but are not limited to, expertise in the following technical areas. Expertise in all these disciplines is not a selection criterion.

- Materials science/engineering or chemistry
- Electrical engineering
- Optics/Optical engineering
- Mechanical engineering
- Thermal science/engineering
- Radiation physics
- Condensed matter physics
- Theoretical chemistry/physics and modeling
- Systems engineering
- Engineering co-design/development
- Multi-physics modeling/simulation
- Digital twin development
- Machine-learning (ML)/artificial intelligence (AI) aided design
- Corrosion

#### **1.D.4 Out-of-Scope Research Areas**

The following areas of research are out of scope for the SOLSTICE program:

- Component development that cannot be independently tested and evaluated (i.e. by a third party outside the Performer team) to assess contribution toward the program metrics.
- Development of novel chemistries for electrochemical or thermal energy storage
- Development of cell-level improvements (e.g. cathode, anode, separator, electrolyte) for electrochemical storage devices
- Solutions that employ radioactive materials as part of components or would integrate radioactive materials as part of a system-level design.



- Development of components that adjust the orientation of the entire power system at the time of deployment or over time for Track 2 (terrestrial) applications. (e.g. macroscopic tracking devices)
- Approaches that propose, or are likely to result in, only incremental improvements over the current state-of-the-art.
- Approaches with significant limitations on operating conditions, operational parameters, or deployment needs.
- Approaches that are incompatible with remote, unattended operation.
- Approaches that cannot be packaged for safety.
- Development of component technology that is not integral to the operation of the power system required for the Offeror's approach, unless it supports the greater SOLSTICE program, as approved at the discretion of the SOLSTICE PM.
- Solutions that cannot be made sufficiently robust for deployment and use in the target application environments for each respective track.
- Research that does not have strong theoretical and experimental foundations or plausible scientific support for the Offeror's claims.

### 1.D.5 Government-Furnished Capabilities (GFC)

Due to the limited availability of high-efficiency multijunction solar photovoltaic cells (particularly those that are spectrally matched to the terrestrial AM1.5 spectrum), the Government will allow Offerors to propose the use of MOCVD and/or HVPE growth capabilities possessed by the National Renewable Energy Laboratory (NREL) T&E partner to grow solar cell device structures **previously published by NREL researchers and grown using NREL facilities/equipment**. The samples can be grown on a limited number of small substrates that, when fabricated, could provide 1cm<sup>2</sup> area devices for demonstration purposes, or component testing and eventual integration into power systems. Offerors can process the device structures into fabricated solar cells within their own teams, or can utilize standard processing capabilities available at NREL including a quick-turnaround process, literature-defined process sequence, or a specific standard processing sequence. New solar cell designs or previously reported designs not previously prepared at NREL will need to be fabricated within an Offeror's team and cannot be fabricated using this GFC. Offerors proposing to Track 1 or 2 of the program may propose to use this GFC. Offerors are not required to use this GFC as part of their proposed projects. The costs of the cell growths and/or processing, which depend on device design complexity, must be included as part of the Offeror project budget in their Volume II - Cost Proposal submission, if requested.

### 1.E. Testing and Evaluation (T&E)

All deliverables will be subjected to independent, objective T&E arranged by the Government that will verify progress toward achieving program objectives at defined points during the program. Achievement of program metrics at these defined points may be a condition for continued participation in the SOLSTICE program. T&E protocols will be continually evaluated and updated as necessary throughout the program to fulfill program goals. Performers are expected to develop and conduct their own T&E program for their components and power systems continually throughout the program to measure progress toward achieving program metrics. Proposals shall describe how the Offeror plans to conduct their own T&E in preparation for the independent Government T&E of deliverables described below. Offerors are encouraged to conduct their own internal T&E with as realistic conditions as possible for the target

environment (i.e. space or terrestrial surface). The descriptions below are the starting point for T&E protocol development, with more detailed protocols to be presented at program kickoff within Version 1 of the T&E Procedures Manual. Revisions to the T&E Procedures Manual are expected at each of the subsequent program phase boundaries, but may be made at any time as necessary. Performers will be expected to maintain close communication with the Government T&E teams to plan for and respond to requests to facilitate the T&E effort. At the T&E partners' sole discretion, Test Article analysis may cease if personnel or equipment are jeopardized by continued testing, which may result in a Performer failing to demonstrate program metrics.

The schedule of deliverables and T&E events can be found in the Program Milestone, Deliverables and Testing Schedule in Table 6 in Section 1.G.3. of this BAA. There will be two rounds of T&E in each of Phases 1 and 2 of SOLSTICE. Phase 3 will have one round of T&E as described in the schedule. Performers may expect up to three months of time after test articles are delivered before independent Government results are available. Performers will be responsible for transportation of deliverables to designated T&E sites in compliance with all applicable laws and regulations. In each T&E round, the performance of the delivered designs, models, and hardware will be tested and assessed against the performance metrics listed in Table 4 (Track 1) and Table 5 (Track 2) in Section 1.F. of this BAA. If there are testing considerations specific to an Offeror's solution that may be incompatible with the notional testing protocols described herein, these must be described in the Offeror's proposal along with suggestions for modifications. The Program Manager will release a subset of the T&E data to the Performer teams; some test articles may be returned to Performers, but for planning purposes there should be no expectation of return of the test articles following delivery to the T&E teams.

Details of project deliverables are provided in Section 1.G, but the key evaluation foci across the program will remain on 1) design documentation, 2) modeling (component and power system), and 3) hardware test and demonstrations:

### **Design documentation**

The T&E team will review power system design documentation provided by Performers at the designated timepoints to evaluate the likelihood of the Performer's design to reach the SOLSTICE performance metrics (see Section 1.F). Design documents should include, at a minimum, detailed drawings and schematics of power systems planned at each phase, clearly showing electrical wiring routing, grounding schema, component identities and locations within devices. Design documentation should include descriptions, tables, and figures that detail the range of designed operating parameters of the components and system as a whole and measures to ensure safe operation.

### **Modeling**

Performer modeling work is expected to mature and increase in model fidelity, precision, and sophistication as the SOLSTICE program progresses, with feedback loops from the experimental data providing validation or spurring model adjustment. (see Table 1) Performers are expected to couple (among other variables) optical, electrical, thermal, and mechanical impacts into their component and system-level models to understand the impacts of their design choices. The T&E partners will be evaluating models generated by Performer teams for reasonableness and provide suggestions when possible, for improvement and better integration with their own modeling work. Software/modeling deliverables must adhere to the submission guidelines provided by the T&E Procedures Manual to

allow for evaluation by the T&E Partners and clear statement of the assumptions and calculations used to determine reported performance. The T&E teams will provide information on needs to interface Performer models with their own modeling at program kickoff.

Phase	Components performance models	PPS performance models	Scaled systems performance models	Scaled system cost model
1	◐	◑	◒	○
2	●	◑	◑	◒
3	●	●	◑	◑

**TABLE 1: Qualitative characterization of model fidelity expectations by the end of each SOLSTICE program phase. (fully-filled circle signifies highest possible level of fidelity)**

### Hardware demonstrations

Hardware deliverables (components in Phase 1 and power systems in Phases 2 and 3) will be tested as received and must contain suitable electrical and mechanical interface points as described in the T&E Procedures Manual.

Components in Phase 1 must be “self-contained”, meaning they can be connected to standard laboratory monitoring equipment to measure performance without significant de-integration, setup, or assembly by the T&E team. Performers must provide instructions for setup and required testing conditions of components submitted for T&E so that the T&E team can measure the performance attributes intended for submitted components. Performers should provide the T&E team with ranges of expected values for the observable measurements associated with each component.

Power systems must deliver power immediately upon excitation. Performers must provide the maximum power point ( $W_{mp}$ ) to the T&E team for each test article provided in the form of a current-voltage sweep plot at 298 K (hereafter referred to as an I-V sweep) clearly showing  $W_{mp}$ , open circuit voltage ( $V_{OC}$ ), and short circuit current ( $I_{SC}$ ). Safe operating ranges for current and voltage must be specified to the T&E team. If at any point during test article assessment the T&E team (at their sole discretion) deems further testing of a test article to be unsafe for the test equipment or T&E personnel, the testing of that test article will cease immediately and the data/results for that test article will be interpreted as captured up to that point and no further.

Characterization of power systems (components in Phase 1 or PPSs in Phase 2 and 3) will generally be conducted under solar-simulated light and a range of environmental conditions (outlined below) with output monitored via attachment of the output terminals to an electronic load simulator to test the device under operation. When possible, current-voltage (I-V) sweeps will be taken from components or combinations of components for troubleshooting or providing inputs to modeling. Performers should incorporate access points within their system to enable T&E partners to probe electrical, thermal, or other properties at key points in their system (e.g. interfaces between components).

Current, voltage, time, derived electrical parameters (using current, voltage, and/or time), and temperature will be recorded for each power system tested. Temperature will be measured by sensors attached to the test articles in positions chosen by the T&E team at their sole discretion (which could be influenced by performer recommendations with appropriate rationale). Test Articles submitted for Phase 1 testing will be assessed at room temperature and pressure under AM0 (Track 1) or AM1.5 (Track 2) solar simulated irradiance, as appropriate. By Phase 2 T&E events, Performers will be expected to have developed and integrated a system to appropriately manage thermal loads on PPSs to maintain consistent operation in the test environment. Performers must be prepared to discuss their safety plan for 1) material encapsulation, and 2) thermal management with the T&E team by the beginning of Phase 2 to assess risks associated with planned testing during the Phase 2 and 3 T&E events. At the T&E team's sole discretion, experimentation with any given test article will cease if safe, controllable operation cannot be maintained.

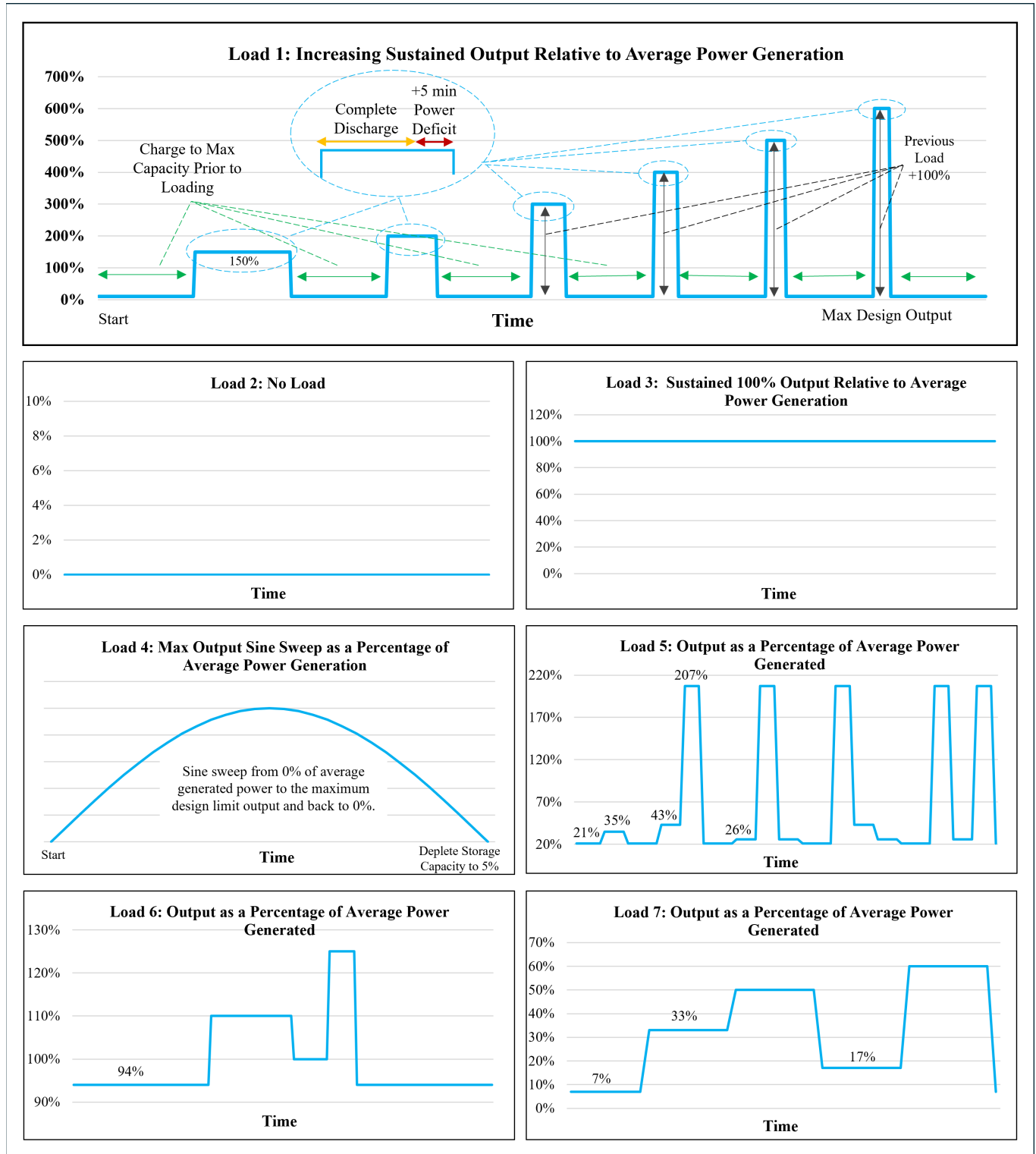
No specific load requirements are defined in this program to allow Offerors greater freedom to innovate in their power systems. However, several load profiles (see Figure 1) are expected to be used as part of the T&E effort to better understand the performance strengths and weaknesses of each system. Offerors may reference these profiles in their proposals or suggest a different load profile that showcases the benefits of their approach. The first load profile in Figure 1 will serve as a focal point for testing and Offerors should consider how their system could continue to drive towards higher power levels for longer periods of time.

The following provides additional detail on anticipated T&E plans by SOLSTICE program phase:

For Phase 1 (Proof of Concept), each Performer shall deliver at least one (1) POC test article at the first T&E event and at least three (3) POC test articles at the second T&E event, consisting of the innovative components integrated as necessary with COTS components to demonstrate measurable performance sufficient to model and extrapolate to the system-level metrics outlined in Table 4 (space applications) or Table 5 (terrestrial applications) in Section 1.F. Offerors shall specify the form factor of their test articles for this Phase and the calculations they recommend to extrapolate performance to a power system output level. Offerors must provide test articles in the number required at each T&E event for **each** novel component technology they plan to implement as part of their system design. For example, if two novel components are being proposed, then a total of two test articles will be delivered at the first Phase 1 T&E event and a total of six test articles (three of each component) will be delivered at the second Phase 1 T&E event. Alternatively, if appropriate, Offerors may choose to integrate several innovative components into a single demonstration test article to provide in the number required at each T&E event. Unless an energy storage medium is essential to the innovation(s) being demonstrated, proof of concept test articles are not expected to have an integrated battery or charge controller.

For Phase 2 (Prototype Demonstration), each Performer shall deliver one (1) Prototype Power System (PPS) test article for the first T&E event and three (3) PPS test articles for the second T&E event. Each PPS will integrate novel component(s) and system-level approaches consistent with the proposed system utilizing the standardized Power System Testbed (PST) form-factor that meets the requirements specified by the T&E team. Specifics of the PST electrical and mechanical interface will be finalized by the SOLSTICE kickoff meeting, but the general PST form factor includes the following requirements: 1) ~10 cm x ~20 cm x ~10 cm body dimensions (i.e. similar to a 2U cubesat) with supporting frame at the interfaces of the body faces and open internal volume for integrating components, 2) rechargeable energy storage medium, 3) standard attachment points for hardware and electrical integration with T&E partner

equipment. Aperture area (for energy collection or rejection) must be restricted to the body of the PPS at this Phase and not deploy beyond the volume of the PPS. Performer PPSs integrated into the standard PST architecture will be shipped to the T&E partners for evaluation at two timepoints during Phase 2 and must be transportable by common shipping carriers.

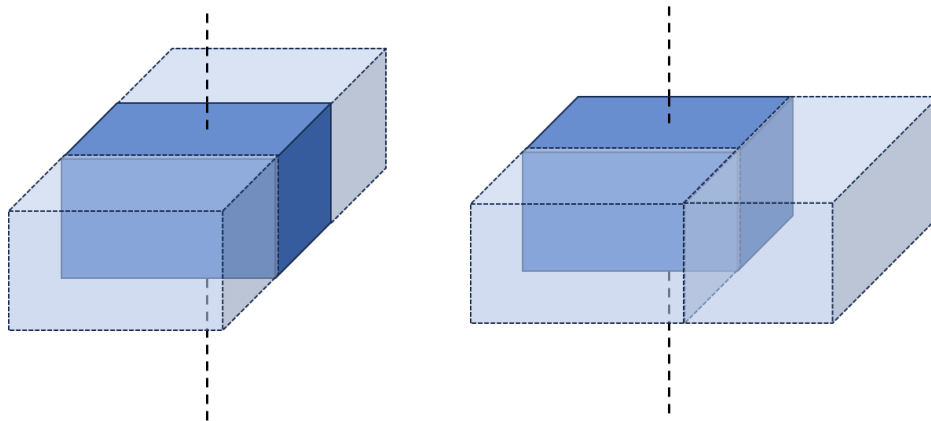


## FIGURE 1: Seven Load Profiles to Characterize PPS Functionality & Performance

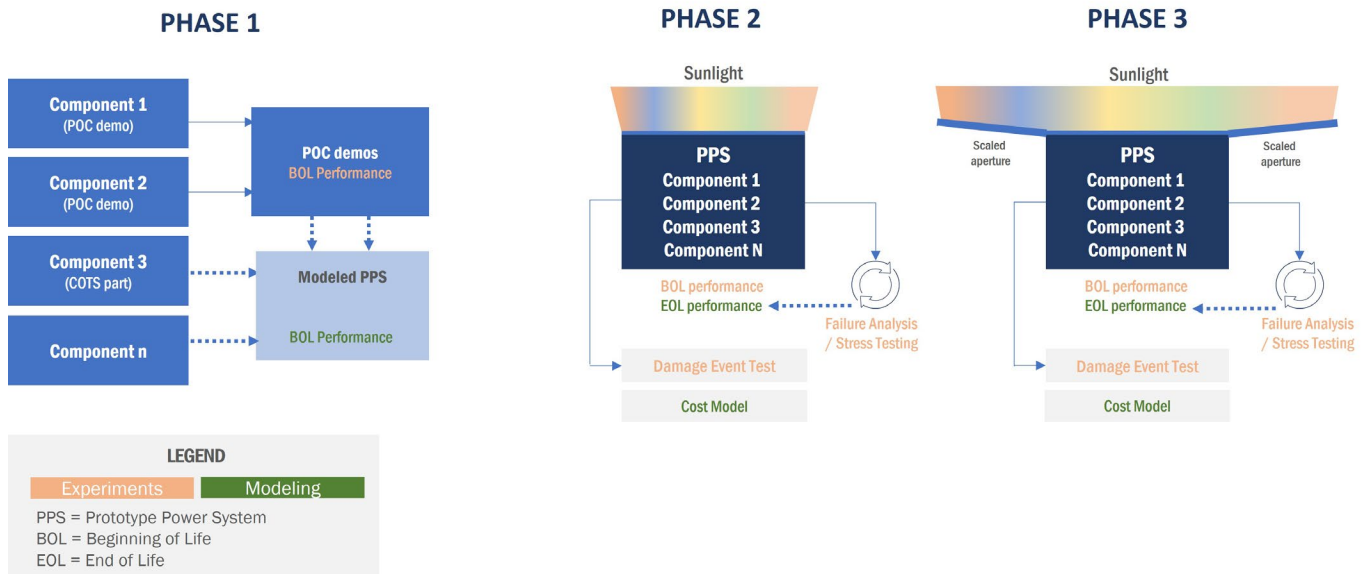
For Phase 3 (Scalability and Durability Assessment), each Performer shall deliver two (2) PPS test articles integrated into the PST design specifications set forth in the T&E Procedures manual for Phases 2 and 3. Since Phase 3 PPSs could deploy beyond the body of the PST, Offerors must specify in their proposal the intended size of their prototype at this phase and how they plan to conduct internal testing. Any deployment beyond the body of the PPS must be contained within a volume of 4U attached outside the 2U of the PST body in any contiguous or non-contiguous arrangement (i.e. maximum total of 6U volume for body plus deployed volume; 20 cm x 10 cm x 10 cm body plus 4 units of 10 cm x 10 cm x 10 cm attached in any contiguous or non-contiguous arrangement outside the body). See Figure 2 for examples of two possible structures. PPSs will be shipped to the T&E partners for evaluation during Phase 3 and must be transportable by common shipping carriers. The Phase 3 volumetric limits intend to prove out systems that are of manageable and sufficient size to advance program objectives with particular consideration for ensuring ability to test and availability of evaluation equipment (i.e. TVAC) and are not intended to limit innovation. At the sole discretion of the SOLSTICE PM, performer requests for deployments that exceed the Phase 3 volume limits identified above may be entertained in order for performers to demonstrate innovative concepts necessitating deviation, but that are still aligned with the objectives of SOLSTICE.

A summary of exemplar Test Article delivery configurations by program phase and the associated tests can be found in Figure 3.

The tests listed in Sections 1.E.1 and 1.E.2 are expected to be used to determine Performer Test Article performance relative to the metrics listed in Table 4 (Track 1) or Table 5 (Track 2) in Section 1.F, but the T&E team may perform additional testing on components or systems to ascertain performance variation, potentially including, quantum efficiency (QE), photoluminescence, electroluminescence, infrared thermography, and other tests not listed below. Since Phase 1 physical deliverables consist of test articles with POC plus COTS components that may not fully represent the system-level performance expected, for the purposes of Phase 1 power system modeling, Performers must supply models that include equations and assumptions into which measured data from the component test articles shall be input to demonstrate that the system metrics for Phase 1 will be met. Assumptions and modeling methodology must be explained and will be assessed by the T&E team at specific points throughout the program to assess reasonableness.



**FIGURE 2: Schematic of two of the possible Phase 3 PSS configurations. Dark blue indicates PPS body, light blue areas indicate available areas for deployable structures in Phase 3. Vertical dashed line indicates central axis of PPS.**



**FIGURE 3: Summary SOLSTICE Test Article descriptions and tests by phase. Design is a potential exemplar and meant for illustrative purposes only.**

The tests and procedures outlined in the following sections are preliminary to allow Offerors to understand the anticipated scope of the testing; tests and procedures are subject to change.

**1.E.1 TRACK 1 TESTING (Space Applications)**

Government T&E of PPSs will be assessed through a combination of room temperature and simulated space environment (i.e. thermal-vacuum (TVAC) chamber) testing before and after stress testing as shown in Table 2.

**TABLE 2: Track 1 (Space) Test & Evaluation Schedule and Anticipated Procedures**

		POC Test Articles		Prototype Power Systems		
		Phase 1		Phase 2	Phase 3	
	<b>T&amp;E Event #:</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
	<b>Performer POP Month Due:</b>	7	14	24	31	43
	<b>Minimum Test Articles Delivered:</b>	1	3	1	3	2
<b>#</b>	<b>TRACK 1 Testing Procedure</b>					
1	Thermal cycling	N/A	10 cycles	N/A	100 cycles	100 cycles
2	UV irradiation	N/A	10 d	N/A	30 d	30 d
3	Vacuum I-V Sweep & outgassing of volatile materials	N/A	N/A	Test	Test	Test
4	Electron and proton irradiation	N/A	N/A	N/A	Test	Test
5	Simulated damage events	N/A	N/A	N/A	Test	Test
6	Mechanical stress	N/A	N/A	N/A	N/A	Test*

\* Performed after all other testing is completed to help inform the next stage of development

*Notes on TRACK 1 Testing Procedures:*

- (1) Thermal cycling will be performed to emulate the temperature extremes expected for power systems in an earth orbit environment. Temperatures from 173 K to 373 K are anticipated to be used, but will be finalized in the T&E Procedures Manual. A light I-V sweep will be taken at intermediate time intervals (between the exposure start and the timepoint listed in the table) and compared to the initial measurement. Thermal cycling will cease if any of the intermediate timepoints reveals a change in the  $P_{mp}$  by more than 50% relative to initial measurement.
- (2) Accelerated UV aging of samples will be carried out using UV wavelengths characteristic of the AM0 solar spectrum for the equivalent period of time specified in the table. A light I-V sweep will be taken at intermediate time intervals (between the exposure start and the timepoint listed in the table) and compared to the initial measurement. UV irradiation testing will cease if any of the intermediate timepoints reveals a change in the  $P_{mp}$  by more than 50% relative to initial measurement. Phase 1 test articles may contain protective measures for components not intended to be irradiated which will not count against the weight metric.
- (3) Samples will be exposed to a thermal-vacuum chamber ( $\sim 77$  K and  $\sim 10^{-6}$  torr) over a range of temperatures to ascertain the degree of volatile condensable materials (VCMs) that are released.
- (4) keV electron/proton irradiation testing with fluence levels consistent with a multi-year mission in LEO or GEO using protocols informed from AIAA S-111 (Qualification and Quality Requirements for Space Solar Cells)
- (5) Aperture areas will be subjected to a combination of non-destructive and potentially damaging tests (performed last on test articles) designed to simulate single-event threats in a space environment, including debris/micrometeoroid impact damage, high flux irradiation at multiple angles of incidence, “hot spots,” and other potential physical threats. Sizes on the order of several square millimeters to centimeters for the simulated debris or high flux irradiation spot size should be assumed. Power density measurements will be conducted before and after the simulated threat tests.
- (6) Preliminary assessment of mechanical stress risks associated with launch and deployment, particularly vibration. Performance of PSTs before and after vibrational testing in Phase 3 will be assessed.

**The following tests will be leveraged throughout the T&E events:**

**Test 1.1: Power Density.** In Phase 1, Performers will provide models and calculations that project the power density metrics at the PPS power levels designed for Phases 2 and 3 (and beyond) using experimentally-derived performance of components (e.g. PV I-V curve, optical efficiency, DC-DC conversion efficiency) fabricated in Phase 1 and reasonable assumptions/extrapolations. In Phases 2 and 3, to determine a PPS’s specific power and power density, each of the PPS Test Articles will be weighed and its volume and aperture area will be determined (subtracting-out the weight and volume of the PST in



Phases 2 and 3 using an empty PST provided by the Performer). Aperture area will be determined by tracing the perimeter of the outer-most area of the surface intended to absorb light, inclusive of all necessary supporting materials and/or spacing in between components, using the test article central axis that points toward the illumination source as a reference (see Figure 2). Beginning of Life (BOL) power density metrics will be calculated based upon each test article's median  $P_{mp}$  over the initial hold time at 298 K, and its mass or volume. The median result of these tests across all test articles in a T&E event will be compared against target values in Table 4 in Section 1.F of this BAA, at STP for Phase 1 and the first T&E event of Phase 2, and under simulated space conditions for the remaining T&E events. EOL power density estimations will be extrapolated from BOL and the results of performance testing before and after the stress testing described in the table above using modeling performed by the T&E team. Power density metrics will be measured under the following conditions:

- a. **Standard Temperature and Pressure (STP) testing.** Test articles will be maintained at 298 K under AM0 solar-simulated light for a period of time to measure the stability of the output and variability between test articles. (i.e. any built-in thermal control on the PPS in Phases 2 and 3 will be supplemented via outside temperature control devices to maintain 298 K) The median of the  $W_{mp}$  data captured over the hold period will be compared to the minimum power output metric. A light and dark I-V sweep will be captured and key parameters will be extracted (i.e.  $I_{sc}$ ,  $V_{oc}$ ,  $V_{mp}$ ,  $I_{mp}$ ,  $P_{mp}$ )
- b. **Temperature dependence.** Test Articles will be maintained at specific temperatures between approximately 273 – 310 K until they reach thermal equilibrium. A light and dark I-V sweep will then be captured at that temperature setpoint and key data points will be extracted (i.e.  $I_{sc}$ ,  $V_{oc}$ ,  $V_{mp}$ ,  $I_{mp}$ ,  $P_{mp}$ ). The temperature will be adjusted within the aforementioned range increasingly toward the extremes and the experiment will be repeated until the full range has been captured or the test article fails. In this manner, a  $P_{mp}$  vs temperature plot will be generated.
- c. **Simulated space testing.** In Phase 2, T&E Event 4 and Phase 3, T&E Event 5, PPS test articles will be placed in a TVAC chamber (approximately 77 K and  $10^{-6}$  torr) where they will achieve thermal equilibrium and then exposed to AM0 solar-simulated light. The PPS temperature will be monitored continually for a period of time and an I-V characteristic will be captured periodically throughout the test.
- d. **Angular Dependence.** Test Articles will be oriented at various angles of incidence (AOI) relative to the simulated solar flux. In Phase 1, if appropriate for the test articles received, test articles will be mounted to a stage that can achieve various AOIs from 0-90 deg across an aperture hemisphere and I-V curves will be captured at 298 K in a manner similar to that described in Test 1.1a. In Phases 2 and 3, PPSs will be mounted to a similar stage to adjust AOIs from 0-90 deg across an aperture hemisphere and I-V curves will be captured at 298 K.

### **Time-Weighted System Energy Efficiency ( $\eta_{sys}$ ) Simulations**

The T&E team will construct an orbital modeling framework to predict  $\eta_{sys}$  and EHY of PPSs with several notional orbital parameters from LEO to GEO. BOL and EOL baseline and Performer-assembled PPS performance will be assessed according to the T&E Procedures Manual (first version available at program kickoff). Performance of each PPS over a simulated 5 to 10-year mission at each orbit will be extrapolated, considering failure modes and degradation observed in performance and durability testing on performer PPSs. Key factors impacting PPS performance such as sun-angle over time, shading, and temperature will be considered, where applicable, including Performer strategies to mitigate negative impacts. Loss mechanisms will be characterized and systematically evaluated as exemplified in the Efficiency Loss Register Template for Offerors attachment to inform the modeling effort. See Note for Metric 1 in Table

4 for details about  $\eta_{\text{sys}}$  calculation. The  $\eta_{\text{sys}}$  and EHY predicted by this modeling framework will be compared to a baseline PPS fabricated by the T&E team. The first mission year energy captured divided by the energy available from sunlight (and/or other sources) available given the specified orbit will be used for the Metric 1 time-averaged system efficiency calculation. (See Section 1.F Program Metrics)

**1.E.2 TRACK 2 TESTING (Terrestrial Surface Applications)**

PPSs will be assessed through a combination of room temperature and elevated/reduced environmental temperature testing (approximately 253 – 353 K) before and after stress testing as shown in Table 3.

**TABLE 3: Track 2 (Terrestrial) Test & Evaluation Schedule and Anticipated Procedures**

		POC Test Articles		Prototype Power Systems		
		Phase 1		Phase 2		Phase 3
	T&E Event #:	1	2	3	4	5
	Performer POP Month Due:	7	14	24	31	43
	Minimum Test Articles Delivered:	1	3	1	3	2
#	TRACK 2 Testing Procedure					
1	Thermal cycling	N/A	10 cycles	N/A	100 cycles	100 cycles
2	AM1.5 UV irradiation	N/A	10 d	N/A	30 d	30 d
3	Damp heat test	N/A	N/A	N/A	10 d	30 d
4	Soiling	N/A	N/A	N/A	Test	Test
5	Simulated damage events	N/A	N/A	N/A	Test	Test
6	Mechanical stress (vibration, shock, bending)	N/A	N/A	N/A	N/A	Test*

\* Performed after all other testing is completed to help inform the next stage of development

*Notes on Testing Procedures:*

- (1) Thermal cycling will be performed to emulate the temperature extremes expected for solar absorbers on the earth. Temperatures from 228-358 K are anticipated to be used, but will be finalized in the T&E Procedures Manual. A light I-V sweep will be taken at intermediate time intervals (between the exposure start and the timepoint listed in the table) and compared to the initial measurement. Thermal cycling will cease if any of the intermediate timepoints reveals a change in the  $P_{\text{mp}}$  by more than 50% relative to initial measurement.
- (2) Accelerated UV aging of samples will be carried out using UV wavelengths characteristic of the AM1.5 solar spectrum for the equivalent period of time specified in the table. A light I-V sweep will be taken at intermediate time intervals (between the exposure start and the timepoint listed in the table) and compared to the initial measurement. UV irradiation testing will cease if any of the intermediate timepoints reveals a change in the  $P_{\text{mp}}$  by more than 50% relative to initial measurement. Phase 1 test articles may contain protective measures for components not intended to be irradiated which will not count against the weight metric.
- (3) 85 deg C/85% RH test consistent with IEC 61215

- (4) Simulated soiling and “natural” cleaning (i.e. as could be expected from rain, wind) protocols will be performed on aperture areas and power density measurements will be captured in both soiled and cleaned states to assess the impacts on mission lifetime energy harvesting yield (EHY).
- (5) To assess the resilience of the system after potential damage events, a portion of the aperture area (and other potential energy conversion area) will be occluded/disabled in a non-destructive fashion. Sizes on the order of several square centimeters for the simulated disabled area should be assumed. Power density measurements (as described in Test 1.1) will be conducted before and after the simulated impact.
- (6) Preliminary mechanical stress testing including vibration, shock, and bending (wind loading), consistent with deployment and weather conditions expected in earth surface environments, protocols TBD.

**The following tests will be leveraged throughout the T&E events:**

**Test 2.1: Power Density.** In Phase 1, Performers will provide models and calculations that project the power density metrics at the PPS power levels designed for Phases 2 and 3 using experimentally-derived performance of components (e.g. PV I-V curve, optical efficiency, DC-DC conversion efficiency) fabricated in Phase 1 and reasonable assumptions/extrapolations. In Phases 2 and 3, to determine the PPS’s power density metrics, each of the PPSs will be weighed and its volume will be determined (subtracting-out the weight and volume of the PST in Phases 2 and 3 using an empty Performer-provided PST). Aperture area will be determined by tracing the perimeter of the outer-most area of the surface intended to absorb light, inclusive of all necessary supporting materials and/or spacing in between components, using the test article central axis that points toward the illumination source as a reference (see Figure 2). BOL power density metrics will be calculated based upon each test article’s median  $P_{mp}$  over the initial hold period at 298 K, and its mass or volume. The median result of these tests across all test articles in a T&E event will be compared against target values in Table 5 in Section 1.F of this BAA. EOL power density estimations will be extrapolated from modeling performed by the T&E team to capture the impacts of environmental stressors as determined by stress testing discussed above. Power density metrics will be measured under the following conditions:

- a. **Standard Temperature and Pressure (STP) testing.** Test articles will be maintained at 298 K under AM1.5 solar-simulated light for a period of time to measure the stability of the output and variability between test articles. (I.e. any built-in thermal control on the PPS in Phases 2 and 3 will be supplemented via outside temperature control devices to maintain 298 K) The median of the  $W_{mp}$  data captured over the hold period will be compared to the minimum power output metric. A light and dark I-V sweep will be captured and key parameters will be extracted (i.e.  $I_{sc}$ ,  $V_{oc}$ ,  $V_{mp}$ ,  $I_{mp}$ ,  $P_{mp}$ )
- b. **Variable irradiance testing.** Test articles will be maintained at 298 K under direct normal AM1.5 solar-simulated light at varying irradiance levels between 0-1000 W/m<sup>2</sup>. A light I-V sweep will be captured to generate a  $P_{mp}$  vs irradiance plot.
- c. **Temperature dependence.** Test articles will be maintained at specific temperatures between approximately 273-310 K (Phase 1) and 228-358 K (Phases 2 and 3) until they reach thermal equilibrium under direct normal AM1.5 solar-simulated light. A light and dark I-V sweep will then be captured at that temperature setpoint and the key parameters will be extracted (i.e.  $I_{sc}$ ,  $V_{oc}$ ,  $V_{mp}$ ,  $I_{mp}$ ,  $P_{mp}$ ). The temperature will be adjusted within the aforementioned range at increasingly

toward the extremes and the experiment will be repeated until the full range has been captured or the test article fails. In this manner, a  $P_{mp}$  vs temperature plot will be generated.

- d. **Angular Dependence.** Test Articles will be oriented at various angles of incidence (AOI) relative to the simulated solar flux. In Phase 1, if appropriate, test articles will be mounted to a stage that can achieve various AOIs from 0-90 deg across an aperture hemisphere and I-V curves will be captured at 298 K in a manner similar to that described for the STP testing. In Phase 2, PPSs will be mounted to a similar stage to adjust AOIs from 0-90 deg across an aperture hemisphere and I-V curves will be captured at 298 K as well as at various surrounding temperatures between 228-358 K.

### **Time-Weighted System Energy Efficiency ( $\eta_{sys}$ ) Simulations**

The T&E team will construct a modeling framework to predict  $\eta_{sys}$  and EHY of PPSs with fixed-tilt aperture area (set at tilt and azimuth angles of Offeror's choosing) for several notional target environments. Target locations for analysis of EHY include Golden, CO (cold, dry climate), Phoenix, AZ (hot, dry climate), Honolulu, HI (hot, humid climate), and Juneau, AK (cold, humid climate). These locations are subject to change throughout the program. BOL and EOLPPS performance will be assessed according to the T&E Procedures Manual (first version available at program kickoff). Performance of each PPS over a simulated 3 to 10-year mission in each environment will be extrapolated, considering failure modes and degradation observed in performance and durability testing on performer PPSs. Key factors impacting PPS performance such as variable sun-angle, intra-day and seasonal solar spectrum changes, temperature, weather (i.e. cloud cover), shading from soiling, and other impacts for the given locations on earth will be considered, where applicable, including Performer strategies to mitigate negative impacts from these variables. Loss mechanisms will be characterized and systematically evaluated as exemplified in the Efficiency Loss Register Template for Offerors attachment to inform the modeling effort. See Note for Metric 1 in Table 5 for details about  $\eta_{sys}$  calculation. The  $\eta_{sys}$  and EHY predicted by this modeling framework will be compared to a baseline PPS fabricated by the T&E team for the target 3-year mission (10-year stretch target) lifetime. The first mission year energy captured divided by the energy available from sunlight (and/or other sources) at each of the aforementioned locations will be used for the Metric 1 time-averaged system efficiency calculation. (See Section 1.F Program Metrics)

### **1.F. Program Metrics**

IARPA research programs include rigorous evaluations using carefully designed technical performance metrics. Performance against the metrics is used to inform decision-making in IARPA research programs; for example, the exercise of options to continue performance under research contracts will be based on achievement of program metrics. IARPA has defined program metrics to evaluate effectiveness of the proposed solutions in achieving the stated program goal and objectives, and to determine whether satisfactory progress is being made to warrant continued funding of the Performers. The metrics described in this BAA are shared with the intent to bound the scope of the effort, while affording Offerors maximum flexibility, creativity, and innovation in proposing solutions to the stated problem. The most desirable proposals will significantly exceed the defined metrics in one or more categories, provided that all of the other metrics are met. Proposals should provide clear justification as to why the proposed approach will be able to meet or exceed the enhanced metric(s). Program metrics may be refined during the various phases of the SOLSTICE program; if metrics change, revised metrics will be communicated to Performers as quickly as possible.

### 1.F.1 Track 1: Space-based Energy Conversion Systems

Metrics for Track 1 are shown in Table 4. Offerors may consider an earth-orbiting satellite in Low Earth Orbit (LEO) or geostationary (GEO) orbits as representative spacecraft, but proposed power systems should be generally applicable to earth-orbiting spacecraft since the metrics represent aggressive performance objectives applicable to multiple mission-critical loads. In Phase 3 of SOLSTICE, the scalability and durability of prototype power systems against potential environmental stressors will be assessed. Unless otherwise noted, metrics represent the median performance (measured or modeled) across all test articles submitted for a particular T&E event. Areal power density targets are listed for Beginning of Life (BOL) and End of Life (EOL) at the five-year timepoint to drive Offerors to propose solutions that will be durable. EHY and EOL values will be modeled from BOL, experimentally derived degradation factors, and other extrapolations drawn from Test Article performance.

**TABLE 4: Technical Metrics for Track 1.  
Space-based Energy Conversion Systems**

#	Performance Parameter	Phase 1: Modeled POC System <sup>4</sup>	Phase 2: Prototype Demonstration	Phase 3: Scalability & Durability Assessment
1	BOL time-weighted system-level energy efficiency, $\eta_{sys}$ (%)	$\geq 30$		
2	BOL and EOL system aperture area power density ( $W_{mp}/m^2$ )	BOL: $\geq 478$ EOL: $\geq 406$		
3	BOL system volumetric power density ( $kW_{mp}/m^3$ )	$\geq 14$		$\geq 20$
4	Demonstration peak power output ( $W_{mp}$ )	N/A	$\geq 7$	$\geq 26$
5	BOL system specific power density ( $W_{mp}/kg$ )	$\geq 7$		$\geq 14$
6	Loss of $P_{mp}$ following damage event (%)	N/A	$< 10$	
7	Sustained Power Output to Energy Depletion (% of avg. Pwr. Generated)	$\geq 100\%$	$\geq 150\%$	$\geq 200\%$

#### **Detailed Metrics Description:**

- (1) The ratio, expressed as a percentage, of the time averaged total power output available from the system to an infinite load divided by the time averaged [solar] power incident to the aperture of the energy conversion system. The numerator of the calculation is the summation of the total power output to an infinite load, after all conversion from all energy harvesting sources (e.g. solar, thermal,

<sup>4</sup> Target system performance parameters for Phase 1 will be calculated from measured component parameters and modeling/simulation results. See the explanation provided in Section 1.E Testing and Evaluation.

etc.), over the first year of operation, in one-minute increments. The denominator of the calculation is the summation of all solar irradiation arriving at the aperture, inclusive of potential macro-level geometric impacts due to off-pointing (cosine losses), over the first year of operation, measured in one-minute increments. Phase 1 metrics are determined from STP testing of components and models extrapolating PPS performance. Phase 2 and 3 efficiencies are determined from time-averaged measurements performed for the range of conditions (e.g. vacuum, temperature, AOI) expected for the PPS on orbit.

- (2) Beginning of Life (BOL) and End of Life (EOL) two-terminal system power output (combined from all energy harvesting devices) at maximum power point following any power conversion/optimization, but excluding power output from any energy storage device(s), divided by the exposed area for energy collection (e.g. sunlight absorption); measured under direct normal 1366 W/m<sup>2</sup> Air Mass 0 (AM0) standard solar-simulated light, following a pre-determined stabilization period (e.g. 1h); For Phase 1, measured at 298 K standard temperature and pressure (STP) surrounding environment. For Phases 2 and 3, measured within a simulated space environment (e.g. thermal-vacuum (TVAC) chamber). No effort will be made to maintain test article at STP. Performers will be required to manage heat loads to maximize performance in a simulated space environment (i.e. only radiative heat transfer is available). Aperture area will be determined by tracing the perimeter of the outer-most area intended to absorb light using the test article central axis as a reference (see diagram in Figure 2). EOL is modeled using the BOL measurement and projected performance indicated from degradation data derived from testing indicated in Section 1.E.1.
- (3) The ratio of the system's measured BOL maximum power point output expressed in Watts ( $W_{mp}$ ), excluding contributions from energy storage device(s), following a pre-determined stabilization period (e.g. 1 hr), divided by the stowed volume represented by the outer mold line of all integrated system components from light collection to two-terminal output as measured in cubic meters (m<sup>3</sup>).
- (4) Minimum power output of test article upon illumination with AM0 1366 W/m<sup>2</sup> solar-simulated light at STP and maximum power point ( $W_{mp}$ ), excluding any net power output from any energy storage device(s), following a pre-determined stabilization period (e.g. 1 hr). Current and voltage requirements are not specified for Phases 1 and 2. A voltage requirement is anticipated to be specified for Phase 3 to enable certain use cases and will be announced during the program.
- (5) BOL maximum power point ( $W_{mp}$ ), excluding any net power output from any energy storage device(s), following a pre-determined stabilization period (e.g. 1 hr), divided by total mass of all Performer-integrated system components on/in the PST structure, excluding the weight of the standardized PST structure.
- (6) Several tests will be conducted to simulate potential damage mechanisms at locations across the test article aperture area (chosen by the T&E team), including, a) high flux irradiation performed at specific angles of incidence, b) a several cm<sup>2</sup> diameter debris impact localized to a similarly-sized segment of the aperture, and c) a several cm<sup>2</sup> ESD damage site. Comparison will be made between pre and post testing  $P_{mp}$  in a simulated space environment (e.g. TVAC under irradiance).
- (7) Sustained Power Output to Energy Depletion. Safe, sustained, maximum output power of system until all energy storage capacity available for output has been depleted. Maximum output power will be represented as a percentage of the modeled average generated system power under an AM0

spectrum over the course of a typical light/dark cycle and as defined in the T&E Procedures Manual. Load 1 (Figure 1) is the anticipated load profile intended to test this metric. The system is expected to go through a complete discharge in a manner that is safe to the operation of the system components and people. The 5-minute power deficit is intended to characterize system behavior during a brownout condition, to prove safe operation, and the system's ability fully recover. Sustained maximum power output duration will depend on energy storage capacity which will be determined by the Performer in congruence with other BAA objectives.

### 1.F.2 Track 2: Terrestrial Surface-based Energy Conversion Systems

Metrics for Track 2 are shown in Table 5. The metrics represent aggressive performance objectives, achievement of which will extend the performance of multiple systems operating in a range of environments. In Phase 3 of SOLSTICE, the scalability and durability of prototype power systems against potential environmental stressors will be evaluated. Simulated performance in four environments will be assessed: Phoenix, AZ, (hot, dry climate) Honolulu, HI, (hot, humid climate) Juneau, AK, (cold, humid climate) and Golden, CO (cold, dry climate) as part of the program, but additional regions and conditions may be evaluated. Offerors must describe how their system will perform and meet or exceed the technical metrics in these locations. Unless otherwise noted, metrics represent the median performance (measured or modeled) across all test articles submitted for a particular T&E event. Areal power density targets are listed for Beginning of Life (BOL) and End of Life (EOL) at the 3-year timepoint to drive Offerors to propose solutions that will be durable. EHY and EOL values will be modeled from BOL, experimentally-derived degradation factors, and other extrapolations drawn from Test Article Performance.

**TABLE 5: Technical Metrics for Track 2.  
Terrestrial Surface Energy Conversion Systems**

#	Performance Parameter	Phase 1: Modeled POC System <sup>5</sup>	Phase 2: Prototype Demonstration	Phase 3: Scalability and Durability Assessment
1	BOL Time-weighted System Energy Efficiency, $\eta_{sys}$ (%)	$\geq 30$		
2	BOL and EOL system aperture area power density ( $W_{mp}/m^2$ )	BOL: $\geq 370$ EOL: $\geq 315$		
3	BOL system volumetric power density ( $kW_{mp}/m^3$ )	$\geq 10$		$\geq 15$
4	Demonstration minimum power output ( $W_{mp}$ )	N/A	$\geq 5$	$\geq 17$
5	BOL System specific power density ( $W_{mp}/kg$ )	$\geq 5$		$\geq 10$
6	Sustained Power Output to Energy Depletion (% of avg. Power Generated)	$\geq 100\%$	$\geq 150\%$	$\geq 200\%$

<sup>5</sup> Target system performance parameters for Phase 1 will be calculated from measured component parameters and modeling/simulation results for the target environment. See the explanation provided in Section 1.E Testing and Evaluation.

## **Detailed Metric Description**

- (1) The ratio, expressed as a percentage, of the time averaged total power output available from the system to an infinite load divided by the time averaged [solar] power incident to the aperture of the energy conversion system. The numerator of the calculation is the summation of the total power output to an infinite load, after all conversion from all energy harvesting sources (e.g. solar, thermal, etc.), over the first year of operation, in one-minute increments. The denominator of the calculation is the summation of all solar irradiation arriving at the aperture, inclusive of potential macro-level geometric impacts due to off-pointing (cosine losses), over the first year of operation, measured in one-minute increments. Calculation uses available insolation, solar spectrum, and local weather data averages (i.e. cloud cover, wind speed, relative humidity, etc.) obtained from recent annual data (e.g. Typical Meteorological Year, TMY) in the National Solar Radiation Database (nsrdb.nrel.gov) for locations in Golden, CO, Phoenix, AZ, Honolulu, HI, and Juneau, AK, for a stationary device with aperture area pointing at fixed tilt and azimuth angles as specified by the Offeror/Performer. Phase 1 metrics are determined from STP testing of components and models extrapolating PPS performance. Phase 2 and 3 efficiencies are determined from time-averaged measurements performed for the range of conditions (e.g. variable temperature, AOI) expected for the PPS in the aforementioned environments.
- (2) Beginning of Life (BOL) and End of Life (EOL) two-terminal system power output (combined from all energy harvesting devices) at maximum power point following any power conversion/optimization, but excluding power output from any energy storage device(s), divided by exposed area required for energy collection (e.g. sunlight absorption); measured at 298 K Standard Temperature and Pressure (STP) surrounding environment under direct normal 1000 W/m<sup>2</sup> Air Mass 1.5G (AM1.5) standard solar-simulated light following a pre-determined stabilization period (e.g. 1h). NOTE: During Phase 2 and 3 testing, no effort will be made to maintain test article at STP. Performers will be required to manage heat loads to maximize performance. Aperture area will be determined by tracing the perimeter of the outer-most area intended to absorb light including support structure, using the test article central axis as a reference. (see diagram in Figure 2). EOL is modeled using the BOL measurement and projected performance changes indicated from degradation data derived from testing indicated in Section 1.E.2. PPSs must achieve the stated metrics in at least one of the target environments modeled.
- (3) Stowed volume inclusive of all active and passive components from light collection to two-terminal output; measured at BOL and maximum power point ( $W_{mp}$ ), excluding any net power output from any energy storage device, following a pre-determined stabilization time (e.g. 1 hr).
- (4) Minimum output of test article upon illumination with AM1.5 1000 W/m<sup>2</sup> solar-simulated light at STP and maximum power point ( $W_{mp}$ ), excluding any net power output from any energy storage device(s), following a pre-determined stabilization time (e.g. 1 hr). Current and voltage requirements are not specified for Phases 1 and 2. A voltage requirement is anticipated to be specified for Phase 3 to enable near-term end use cases and will be announced during the program.
- (5) BOL maximum power point, excluding any net power output from any energy storage device(s), following a pre-determined stabilization time (e.g. 1 hr), divided by the total mass of Performer-integrated components on/in the PST structure, excluding the weight of the standardized PST structure.



(6) Sustained Power Output to Energy Depletion. Safe, sustained, maximum output power of system until all energy storage capacity available for output has been depleted. Maximum output power will be represented as a percentage of the modeled average generated system power under AM1.5 spectrum over the course of a typical light/dark cycle and as defined in the T&E Procedures Manual. Load 1 (Figure 1) is the anticipated load profile intended to test this metric. The system is expected to go through a complete discharge in a manner that is safe to the operation of the system components and people. The 5-minute power deficit is intended to characterize system behavior during a brownout condition, to prove safe operation, and the system's ability fully recover. Sustained maximum power output duration will depend on energy storage capacity which will be determined by the Performer in congruence with other BAA objectives.

## **1.G. Program Management**

This section describes the planned approach to managing projects throughout the program, Performer expectations, as well as the anticipated program schedule, including Milestones and Deliverables.

Performers are expected to assume responsibility for administration of their projects and to comply with contractual and program requirements for reporting, delivery of Deliverables for testing, and other requirements. Offerors shall detail their approach to managing all aspects of the project to successful completion. Considerations include, but are not limited to, partnering/teaming/subcontractor approach and associated management plan, intended work facilities, staffing plan, procurements plan, and methodologies for actively managing risk, schedule, and cost.

Research and development activity relies on technical achievement and warrants special attention regarding technical performance management. Offerors shall describe their approach to technical management in sufficient detail to demonstrate a high likelihood of success. Offerors shall provide a summary of top technical and programmatic risks on a 5 x 5 risk matrix, with accompanying mitigation strategies and risk management approach not exceeding one half of one page of the submission. Offerors shall provide a summary of significant equipment anticipated for purchase or internal development to support the project.

During program execution, Performers shall provide a Project Management Plan as described in the 1.G.2. Deliverables section of this BAA to the SOLSTICE PM at Kick-Off that addresses the aforementioned aspects in expanded detail and shall be mutually agreed upon between the Performer and the SOLSTICE PM as the governing approach to the project. Periodic reviews shall be conducted by Performers and discussed at Technical & Programmatic Review Meetings as updates to be incorporated into the PMP by Performers as mutually agreed between Performers and SOLSTICE PM. Non-adherence to the PMP, inclusive of the ability to come to agreement on specific elements of the PMP shall be grounds for project termination. As a primary element of the PMP, performers shall deliver a Technical Management Plan as described in the 1.G.2. Deliverables section of this BAA.

At the sole discretion of the SOLSTICE PM, component level innovations deemed as having significant potential implications to the success of the SOLSTICE program may be permitted to continue development work even if the other portions of the project have been cancelled. Such situations, if they arise, will require renegotiation of the PMP and contract SOW.

## **1.G.1 Milestones**

Milestones are Project-specific Government- and Offeror-defined, task-driven intermediate achievements toward meeting the project objectives. Milestones are measurable accomplishments reflected in the work plan and depicted on the schedule. They are typically traceable to the metrics. Milestones provide additional insight into the development of the key aspects of the proposed research beyond the measurement of deliverable performance metrics. They assist the program management team to provide guidance and assistance to Performer teams and will be reviewed during Site Visits and Technical Review Meetings (see Section 1.G.2 below). The milestones will also be used by the Program Manager (PM) to assess the need for any course correction during the program. Project milestones may be refined during the various Phases of the program, as part of the Technical Management Plan review.

Offeror's proposed technical and programmatic milestones shall be included in the Offeror's proposal. For each proposed milestone, the proposal shall describe the milestone, its relationship to program tasks(s) and metrics, criteria for successful achievement of the milestone, and the date by which the milestone shall have been achieved. Offerors should plan to include milestones that demonstrate performance of Test Articles (consistent with modeled or directly measurable program metrics found in Tables 4 or 5) prior to sending to the T&E partners for validation. It is preferred that this milestone information be conveyed in tabular format.

## **1.G.2 Deliverables**

### **1.G.2.a Project Management Plan (PMP)**

Performers shall provide a detailed plan for managing all aspects of the project to successful completion. Considerations include, but are not limited to, partnering/teaming/subcontractor approach and associated management plan, intended work facilities, staffing plan, procurements plan, and methodologies for actively managing risk, schedule, and cost. The PMP shall include the Technical Management Plan (TMP) which shall be incorporated by reference. The PMP shall be updated upon the discussion and mutual agreement to proposed changes, generally expected to take place during monthly review meetings.

### **1.G.2.b Technical Management Plan (TMP)**

Performers shall provide a detailed plan for successful technical execution of their proposed project, including Project and Program level Milestones, Deliverables, key performance parameters (KPPs), an accounting of models necessary to develop and manage, internal test program and associated plans, and timetables for delivery of key components and integrations, the approach for technical risk management, and other technical milestones by all team members involved. The TMP shall also contain a reference list as an accounting of all design documentation as described in this section 1.G.2 Deliverables of the BAA. The TMP will be discussed and agreed-upon with the Program Manager at the start of each Program Phase. Review and update of the TMP will generally take place at each Technical Review Meeting with changes agreed-upon with the SOLSTICE PM. As part of the TMP, Performers must include milestones at least a quarter before T&E events 4 and 5 to develop and discuss plans to mitigate the impacts of durability testing planned at those respective T&E events.

Performers are expected to evaluate their components and power systems continually throughout the program to measure progress toward achieving program metrics. Internal performance testing shall include a subset of the test protocols described in Section 1.E and additional tests to understand performance. The results of internal performance testing shall be included in the Monthly Technical Reports, as internal performance testing is completed, no less frequently than every four months

throughout program performance. The first Monthly Technical Report shall contain a description of the Performer's testing methodology for internal performance testing. The Performer and the PM shall agree on the Performer's testing methodology not later than the 2nd month after program kickoff, with the first internal testing to be completed not later than the 6<sup>th</sup> month of the program.

### **1.G.2.c Phase 1 Component Proof of Concept (POC) Deliverables**

Component POC Deliverables include both hardware Test Articles (described immediately below) and models/calculations of associated components/integrations (see Section 1.G.2.f Modeling Deliverables).

Each Performer shall deliver at least one (1) POC hardware Test Article at the first T&E event and at least three (3) POC hardware Test Articles at the second T&E event for the tests outlined in Tables 2 and 3. A Test Article consists of not less than **each** novel component technology or, if appropriate, the combination of several novel components into a single assembly plus, all necessary COTS components to demonstrate measurable performance sufficient to model and extrapolate to the system-level metrics outlined in Tables 4 or 5 above. At the sole discretion of the SOLSTICE PM, models may be delivered in lieu of certain system components, however, the PM will generally only entertain approval when absent component properties are well understood, generally considered to be COTS and of limited consequence to the system innovation(s). Unless an energy storage medium is essential to the innovation(s) being demonstrated, proof of concept test articles are not expected to have an integrated battery or charge controller, but design documents must specify the intended energy storage medium and associated charging circuitry along with their respective physical properties and contributions to system performance (weight, volume, capacity, efficiency, etc.) for the purposes of evaluating the design.

Component POC hardware Test Article Deliverables can take many possible physical forms, but must be transportable via common commercial shipping carriers and testable by a third-party team of scientists using commercially-available laboratory equipment, supplies, and minimal fabrication/assembly using Performer-provided instructions to obtain the target observables noted by the Performer team in their instructions. Performers will be expected to coordinate closely with the T&E team (including holding briefings and discussion calls) prior to the first T&E event to ensure their intended POC Deliverables are testable by the T&E team and any specialized conditions, handling, or other factors are incorporated into the T&E team testing plans during Phase 1.

### **1.G.2.d Power System Testbed (PST) Sample Deliverable**

Performers shall deliver to the T&E team one sample of their intended Power System Testbed (PST) structure with power output and data interfaces for use in assembling Prototype Power Systems (PPSs) in Phases 2 and 3. Performer PSTs must conform to the PST standard set forth in the T&E Procedures Manual. A preliminary description of the PST standard is described in Section 1.E "Testing and Evaluation", but will be finalized in the T&E Procedures Manual (first version available at program kickoff).

### **1.G.2.e Prototype Power System (PPS) Hardware Test Article Deliverables**

Performers shall provide power system Test Article deliverables as described in Section 1.E "Testing & Evaluation" (T&E), or as modified in the Test and Evaluation Procedures Manual, and shown in the program schedule in Table 6 in Section 1.G.3 Program Milestone, Deliverables and Testing Timeline (below) that are able to meet the metrics set forth in Tables 4 & 5.

### **1.G.2.f Modeling Deliverables**

Performers shall provide all component and system models and/or other calculations to demonstrate that their component solutions and system level approach can be expected to meet the program metrics for the Phase in which they are due. Performers shall, at a minimum, deliver a mass model, a power loss model, thermal models, a volumetric model, a physical (Computer Aided Design – CAD) model, scaling models, cost models, and any other documentation necessary to fully understand, utilize, and reconcile the models against the system as designed, and as the program progresses, as built. Models must project performance to the power system scale intended for Phases 2 and 3.

In addition, performers shall articulate how the proposed solution(s) would scale to address system load demands of 10W, 100W, 1kW, 10kW, and 100kW. Scaling of the system shall be examined on a subsystem by subsystem basis since there exists the possibility that some subsystem elements may scale in a linear fashion (i.e. energy collection mechanisms) while others may scale in a non-linear fashion (i.e. power conditioning equipment). Performers will provide a prediction of scaling complexity, performance, and cost for each associated power output level up to an assumed production rate of 200kW per year.

Performers will deliver models/calculations along with their Test Articles that quantitatively project the performance of their components and integrate the results into the various models detailed below using the measurable data captured from the Test Articles delivered for each respective T&E event. Model deliverables can be in the form of a spreadsheet or alternative quantitative modeling software output that clearly illustrates the calculations and assumptions used in a manner useable and reproducible by the T&E team.

Models will be reviewed by T&E team and SOLSTICE PM team for reasonableness.

#### **1.G.2.f.1 Performance Models: IVP, Power Loss, Efficiency, Thermal, Optical**

Performers shall develop and update performance models that are intended to provide accurate performance estimates across a range of use cases incorporating the range of dependent variables. Performance models shall output, at a minimum, the current, voltage, and power output curves over the duration under analysis (the I,V, & P curves), the power loss within each system element (an exemplar is provided as an attachment to the BAA.) and the associated efficiency model, thermal modeling of each system element and the total system, optical performance modeling, and performance models representing any other area of innovation. While these models are expected to be developed separately initially on the component level, as the program progresses, models shall be expected to be coupled to one another in a manner that they stay consistent between one another as performance of the power system changes, capturing key feedback loops where applicable. (e.g. changes in optical performance may impact device power conversion levels and thermal conditions, which in turn may impact the behavior of the optics and/or device power conversion, etc.)

Performers will deliver models/calculations along with their Test Articles that quantitatively project the performance of their components and integrate the results into the power system models (see Power system model deliverables) using the measurable data captured from the Test Articles delivered for each respective T&E event. Model deliverables can be in the form of a spreadsheet or alternative quantitative modeling software output that clearly illustrates the calculations and

assumptions used. Models must project performance to the power system size intended for Phases 2 and 3.

#### **1.G.2.f.2 Physical Models: CAD, Mass, & Volumetric**

Performers shall develop and periodically update physical models in support of system design and program metrics, including: Computer Aided Design (CAD) models depicting the system's physical configuration and layout including various subcomponents; an itemized mass model that accounts for each element of the intended system, the allocated mass budget for each element and the uncertainty or margin assigned to each in terms of percentage, current status (i.e. measured vs. modeled), and the overall roll-up to the system level; an itemized volumetric model that accounts for each element of the intended system, the allocated volume and the uncertainty or margin assigned to each in terms of percentage, current status (i.e. measured vs. modeled), and the overall roll-up to the system level.

#### **1.G.2.f.3 Scaling Models: Technical & Cost**

Performers shall generate, and update scaling models that articulate how the proposed solution(s) scale, from both technical and direct system cost perspectives to address system load demands of 10W, 100W, 1kW, 10kW, and 100kW. While scaling to power output levels exceeding Phase 2 and 3 is not a requirement of SOLSTICE, it is important for IARPA to understand if and how proposed systems could be scaled and where the "break" points are in the design that would require additional work as well as the manufacturing inflection points for reduced cost due to production volume. Scaling shall be assessed on a subsystem-by-subsystem basis or other appropriate system breakdown as agreed to by SOLSTICE PM. IARPA aims to understand how system elements will scale and how the technical approach could be altered to achieve other system capabilities. Direct system cost refers to the materials, equipment, and fully burdened labor necessary to fabricate the power system in a manufacturing/fabrication setting.

#### **1.G.2.g Design Documentation**

Performers shall develop and deliver all design documentation for hardware, software, firmware, and the like, as well as all assembly, integration, and test procedures and the associated results necessary to entirely and completely reproduce performer systems and results in formats useable by the government and as mutually agreed by Performer and the SOLSTICE PM. Examples include, specifications, a build of materials (BOM), hardware drawings and schematics, electrical wiring diagrams with clear illustrations of component specifications, grounding schema, all uncompiled software code, and other related documentation.

#### **1.G.2.h Operations Manual**

Performers shall develop and deliver a detailed operations manual that specifies the modes of operation for the system, operating procedures, associated limitations for safe operation, and optimal set points.

### **1.G.2.i Manufacturing and Supply Chain Analysis**

Performers shall develop a manufacturing and supply chain analysis that examines anticipated sources for the supply chain necessary to fulfill the target production volume and highlight opportunities to leverage domestic resources or manufacturing. Assumptions included in the model should be carefully detailed and referenced whenever possible.

### **1.G.2.j Technical Written Reports**

Performers shall provide monthly technical reports for the month prior no later than ten (10) calendar days after the first of each month. The technical reports shall include data presented at monthly technical review meetings and will serve as background material for discussion at subsequent meetings. Both the results presented at technical review meetings and technical reports will serve as an official record of progress. Technical reports shall include the results of internal performance tests as agreed-upon with the SOLSTICE PM in the TMP. The IARPA PM will provide guidance on the required content, form, and structure of the Technical Written Reports at program kickoff.

### **1.G.2.k Kickoff and Program Wide Review Meetings**

Kickoff and program wide review meetings shall be held at a location to be determined by the PM, typically in the Washington, D.C. metropolitan area, where Performers shall share non-proprietary information and/or updates with the other Performers. All active Performer teams at the time of Program-wide meetings will be expected to attend unless otherwise directed by the Program Manager. Typically, program-wide review meetings, also known as Principal Investigator (PI) Meetings, will also include breakout sessions for each team to meet individually with the PM, the program management team and the T&E team. At these breakout sessions, any results the Performers assert are proprietary shall be discussed. Performers shall plan to send no more than 2-3 key technical personnel to the program wide review meetings, unless otherwise agreed with the PM. Unless otherwise specified in the program schedule or by the PM, kickoff and program wide review meetings are in addition to the monthly technical review meetings.

### **1.G.2.l Technical and Programmatic Review Meetings**

Performers shall support monthly review meetings in person at the Performer's site (see Site Visits below) or remotely (e.g., by means of telephone, Microsoft Teams, WebEx, video conference or otherwise, at the discretion of the PM). These monthly meetings will consist largely of a technical review of project progress wherein Performers will present their results, describe their progress toward milestones and achievement of performance metrics, and identify any issues that may affect their ability to meet metrics, milestones, or overall program objectives. Key project team members (including subcontractors) that are involved in the work being reviewed are expected to attend and address questions from the PM and the IARPA support team. A subset of the review meeting will be devoted towards reviewing programmatic status, including project financials, staffing, risks, and anticipated changes. The IARPA PM will provide guidance on the required content, form, and structure of these meetings at program kickoff.

### **1.G.2.m Technical Exchange Meetings/Workshops**

Throughout the Program, the PM may call meetings specifically for discussion of topics common to several or all Performers (e.g. technical challenges, market updates, test and evaluation support, technology transfer considerations). These meetings may occur virtually or in-person at TBD locations.

Performers will be expected to attend and engage with other attendees and present on their results if requested by the PM. These meetings are anticipated to take place no more frequently than once per year.

**1.G.2.n Site Visits**

Semi-annual site visits will occur throughout the life of the SOLSICE program. The SOLSTICE program management team and invited representatives of Government agencies and/or the Test & Evaluation team will visit each Performer (and/or subcontractors) at their work site to conduct an in-depth review of progress toward program objectives and to meet with team members. Performers shall host these site visits at the sites where research for the SOLSTICE program is being performed. During site visits, Performers will show their physical capabilities, and introduce the researchers working on the program to the program management team and invited Government representatives. The site visit shall be concurrent with the technical review meeting to be held in the same month. Reports on technical progress, details of successes and issues, contributions to the program goals, and technology demonstrations will be expected at site visits. Performers shall participate and provide final meeting documents, to include captured action items, within 15 calendar days following the meeting. Draft materials, for any presentations, are due 5 workdays prior to the meeting. Additional site visits by the PM, Test and Evaluation partners, government representatives, and/or program support staff throughout the program may be arranged at the discretion of the PM on an as-needed basis.

**1.G.2.o Financial Reporting**

Performers shall provide monthly status reports (MSRs) not later than ten (10) calendar days after the first of each month. The MSRs shall follow an IARPA-provided template to summarize budget and spending and identify any financial issues that may affect the program or put achievement of program objectives at risk.

**1.G.3 Program Milestones, Deliverables and Testing Timeline**

The SOLSTICE program is anticipated to follow the timeline in Table 6, but changes may be necessary depending on extenuating circumstances. Table 6 shows milestones, deliverables dates, testing dates, and dates for program review meetings, including site visits. Deliverables provided to the T&E team shall be received at the T&E site specified by the Government no later than the final day of the listed month in Table 6.

**TABLE 6: Program Milestone, Deliverables and Testing Schedule**

Event	Due Date: Months after Kick-off			Deliverables
	Phase I	Phase II	Phase III	
<b>Kickoff Meeting (Beginning of each Phase) (1.G.2.k)</b>	1	19	37	Read-ahead package due from Performers to the Government 7 days before meeting. If required by the PM, updates after the meeting are due 15 days after the meeting date.
<b>Program Management Plan &amp; Technical Management Plan (TMP) (1.G.2.a &amp; 1.G.2.b)</b>	1	19	37	Schedule and intermediate technical Milestones for internal team agreed upon with Program Manager.

<b>Program Wide Review Meeting (1.G.2.k)</b>	12	27	40	Read-ahead package due from Performers to the Government 7 days before meeting. If required by the PM, updates after the meeting are due 15 days after the meeting date.
<b>Technical &amp; Programmatic Review Meetings (1.G.2.l)</b>	Monthly	Monthly	Monthly	Read-ahead package due from Performer to the Government 2 days before meeting. If required by the PM, updates after the meeting are due 15 days after the meeting date.
<b>Site Visits (1.G.2.n)</b>	2, 8, 15	22, 28, 34	42	Site visits (to be held concurrently with Technical Review Meetings)
<b>Component Proof of Concept (1.G.2.c)</b>	7, 14	N/A	N/A	POC components and models delivered by Performer for T&E. Deliverables shall be received at the T&E site specified by the Government no later than the final day of the listed month.
<b>Power System Testbed Sample (1.G.2.d)</b>	N/A	21	N/A	“Empty” Power System Testbed (PST) conforming to the PST standards set forth in the T&E Procedures Manual delivered to the T&E team, for use in normalizing weight and volume of PSTs.
<b>Prototype Power System (PPS) Test Article (1.G.2.e)</b>	N/A	24, 31	43	Power system delivered by Performer for T&E. Deliverable shall be received at the T&E site specified by the Government no later than the final day of the listed month.
<b>Design Documentation (1.G.2.g)</b>	2, 10, 17	27, 34	41	Delivered by Performer for T&E. Deliverable shall be received at the T&E site by the Government no later than the final day of the listed month.
<b>Performance Models (1.G.2.f.1)</b>	7, 14	24, 31	43	Models and updates due each specified month. Delivered by Performer to SOLSTICE PM and T&E.



<b>Physical Models (1.G.2.f.2)</b>	7, 14	24, 31	43	CAD Models are due during each specified month. During Phase 1 only, CAD models are only required to be delivered if the performer has developed them. Mass, & Volumetric models due at each month specified. Updates shall be incorporated prior to each delivery. Delivered by Performer to SOLSTICE PM and T&E.
<b>Scaling Models (1.G.2.f.3)</b>	N/A	24, 33	46	Technical scaling models due during each specified month. Cost scaling model due month 33 and updated for delivery in month 46 reflecting lessons learned since previous delivery. Delivered by Performer to SOLSTICE PM and T&E.
<b>Operations Manual (1.G.2.h)</b>	7, 14	24, 31	43	Operations Manual shall be updated and delivered at each T&E event for which instruction is needed and as agreed in the TMP.
<b>Manufacturing and Supply Chain Analysis (1.G.2.i)</b>	7, 14	33	46	Analysis due at each specified month based upon intended / utilized materials.
<b>Independent T&amp;E</b>	8-9, 15-16	25-27, 32-34	44-46	Upon receipt of the Performer Test Article Deliverables, T&E will be conducted. Performers may expect test results within two months of test article submission, but no later than the last day of the listed range of months.
<b>Financial and Technical Written Reports (1.G.2.o &amp; 1.G.2.j)</b>	Monthly	Monthly	Monthly	Monthly financial and technical reports are due by the 10 <sup>th</sup> day of the following month, following the format provided by IARPA.
<b>End of Phase</b>	18	36	48	Phase Period of Performance Ends

#### 1.G.4 Meeting and Travel Requirements

Performers are expected to attend program meetings, either at their research facility or at another location to be determined by the PM. Table 6 describes expectations for meetings and travel for the SOLSTICE program. Section 1.G.2 Deliverables describes locations where meetings are to be held as well as the contemplated frequency and locations of such meetings. In addition to ensuring that all required deliverables are made on time, each Performer will be required to be available to the T&E team for questions and troubleshooting during monthly status meetings.

### 1.G.5 Place of Performance

Performance will be conducted at the Performers' (including subcontractors') sites.

### 1.G.6 Period of Performance

The SOLSTICE Program is envisioned as a 48-month effort. Phase 1 will last 18 months; Phase 2 will last 18 months; and Phase 3 will last 12 months.

### 1.H. Acronyms

<b>AM0</b>	<b>Air Mass 0 solar spectrum</b>
<b>AM1.5</b>	<b>Air Mass 1.5 solar spectrum</b>
<b>BAA</b>	<b>Broad Agency Announcement</b>
<b>COTS</b>	<b>Commercial Off The Shelf</b>
<b>DoD</b>	<b>Department of Defense</b>
<b>EHY</b>	<b>Energy Harvesting Yield</b>
<b>HVPE</b>	<b>Hydride Vapor Phase Epitaxy</b>
<b>IARPA</b>	<b>Intelligence Advanced Research Projects Activity</b>
<b>IC</b>	<b>Intelligence Community</b>
<b><math>I_{mp}</math></b>	<b>Current at maximum power point</b>
<b><math>I_{sc}</math></b>	<b>Short circuit current</b>
<b>I-V</b>	<b>Current-Voltage</b>
<b>kWh</b>	<b>Kilowatt-hours</b>
<b>MOCVD</b>	<b>Metal-Organic Chemical Vapor Deposition</b>
<b><math>P_{mp}</math></b>	<b>Maximum Power Point</b>
<b>POC</b>	<b>Proof of Concept</b>
<b>PPS</b>	<b>Prototype Power System</b>
<b>PST</b>	<b>Power System Testbed</b>
<b>PV</b>	<b>Photovoltaic</b>
<b>SOA</b>	<b>State of the Art</b>
<b>SOLSTICE</b>	<b>Superior Options for Long-life Solar Technologies with Impressive Conversion Efficiencies</b>
<b>STP</b>	<b>Standard Temperature and Pressure</b>
<b>T&amp;E</b>	<b>Test and Evaluation</b>
<b>TRL</b>	<b>Technology Readiness Level</b>

TVAC	Thermal-vacuum
VCM	Volatile Condensable Materials
$V_{mp}$	Voltage at maximum power point
$V_{oc}$	Open circuit voltage

## SECTION 2: AWARD INFORMATION

The Government intends to award procurement contracts encompassing all three (3) Phases of the program from this BAA. Offerors may propose to Technical Track 1 or Technical Track 2. Offerors interested in proposing to both Technical Tracks shall submit independent proposals for each. Exercise of the Option Periods shall depend upon performance during Phase 1 - Base Period and subsequent Option Periods, if any, as well as program goals, the availability of funding, and IARPA priorities. Exercising of Phase 2 – Option Period 1 and Phase 3 – Option Period 2 is at the sole discretion of the Government.

Multiple awards are anticipated. The resources made available under this BAA shall depend on the quality of the proposals received and the availability of funds.

The Government reserves the right to select for negotiation all, some, one, or none of the proposals received in response to this solicitation and to make awards without discussions with Offerors. The Government also reserves the right to conduct discussions if determined to be necessary. Evaluation and award of proposals will follow FAR Part 35 processes as described herein. The Government shall not reimburse Offerors for any proposal costs incurred under this BAA.

This announcement constitutes the full solicitation package. This solicitation will be conducted in three specific steps:

**STEP ONE – White Paper**, Submission of White Papers. The Government will review White Papers and encourage or not encourage submission of a full technical proposal. Submission of White Papers is strongly encouraged. White Paper submission is not required to submit a technical proposal in Step Two. All White Papers must be submitted by the due date listed in the General Information Section of this BAA.

**STEP TWO – Volume 1**, Submission of technical proposal. **Notice to Offerors – if there is a large number of Volume 1 proposals submitted, IARPA will prioritize review of Offerors that submitted encouraged White Papers (see Sections 4 and 5 below). As stated in Step One, White Paper submissions are strongly encouraged.** Offerors not encouraged to submit, or Offerors that chose not to submit a White Paper are still permitted to submit a proposal but may not be prioritized for review (see BAA Section 5). All proposals must be submitted by the due date listed in the General Information Section of this BAA.

**STEP THREE – Volume 2, Cost Proposal Submission:** This Volume is only required if the Offeror’s proposal has been selected for negotiation. The notification of selection for negotiation will be issued in writing by the CO and will include a request to submit the full Cost Volume.

Proposals selected for negotiation may result in a procurement contract.

Awards under this BAA shall be made to Offerors on the basis of the Evaluation Factors listed in Section 5 of the BAA, as well as successful completion of negotiations. Proposals selected for negotiation may result in a procurement contract. The Government reserves the right to negotiate the type of contract award (see BAA General Information Item Number 10 – Anticipated Contract Type).

The Government shall contact Offerors whose proposals are selected for negotiations to obtain additional information required for award. The Government may establish a deadline for fact-finding and negotiations that allows a reasonable time for the award of a contract. Offerors that are not responsive to Government deadlines established and communicated with the request may be removed from award consideration. Offerors may also be removed from award consideration should the parties fail to reach agreement within a reasonable time on contract terms, conditions, and cost/price.

### **SECTION 3: ELIGIBILITY INFORMATION**

#### **3.A. Eligible Applicants**

All responsible sources capable of satisfying the Government's needs may submit a proposal. Historically Black Colleges and Universities, Small Businesses, Small Disadvantaged Businesses and Minority Institutions are encouraged to submit proposals and team with others to submit proposals; however, no portion of this announcement shall be set aside for these organizations' participation due to the impracticality of reserving discrete or severable areas of this R&D effort for exclusive competition among these entities. Other Government Agencies, Federally Funded Research and Development Centers, University Affiliated Research Centers (UARC), Government-Owned, Contractor-Operated facilities, Government Military Academies, and any other similar type of organization<sup>6</sup> that have a special relationship with the Government, that gives them access to privileged and/or proprietary information or access to Government equipment or real property, are not eligible to submit proposals under this BAA or participate as team members under proposals submitted by eligible entities. An entity of which only a portion has been designated as a UARC may be eligible to submit a proposal or participate as a team member, subject to an organizational conflict of interest review.

Foreign entities and/or individuals may participate, but only as a part of a U.S. based team. The prime contractor must be a U.S. organization. Foreign entities and individuals may participate as subcontractors or employees of a U.S. organization; however, all foreign participation must comply with any necessary Non-Disclosure Agreements, Security Regulations, Export Control Laws, and other governing statutes applicable under the circumstances. Offerors are expected to ensure that the efforts of foreign participants do not either directly or indirectly compromise the laws of the United States, nor its security interests. As such, both foreign and domestic Offerors should carefully consider the roles and responsibilities of foreign participants as they pursue teaming arrangements.

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<sup>6</sup> There are instances when these types of entities provide a unique facility, specialized equipment or technical service that is not otherwise obtainable. In such cases, Offerors can request use and the Government will determine if the resource can be made available to all Offerors as Government Furnished Property/Equipment/Information/Service. If the resource requested cannot be provided directly by the Government, the Government may consider an Offeror's request for limited use as a procured service not otherwise available only after an OCI review and determination. It is advised that the Offeror have an alternate plan in its proposal in case the Government does not accept the proposed participation. Requests for such resources can be submitted during the Q&A period.

### 3.A.1 Organizational Conflicts of Interest (OCI)

According to FAR 2.101 “*Organizational Conflict of Interest*” means that because of other activities or relationships with other persons, a person is unable or potentially unable to render impartial assistance or advice to the Government, or the person’s objectivity in performing the contract work is or might be otherwise impaired, or a person has an unfair competitive advantage.

In accordance with FAR 9.5, Offerors are required to identify and disclose all facts relevant to potential OCIs involving the Offeror’s organization and any proposed team member (sub awardee, consultant). Under this Section, the Offeror is responsible for providing this disclosure with each proposal submitted pursuant to the BAA. The disclosure must include the Offeror’s, and as applicable, proposed team member’s OCI mitigation plan. The OCI mitigation plan must include a description of the actions the Offeror has taken, or intends to take, to prevent the existence of conflicting roles that might bias the Offeror’s judgment and to prevent the Offeror from having an unfair competitive advantage. The OCI mitigation plan will specifically discuss the disclosed OCI in the context of each of the OCI limitations outlined in FAR 9.505-1 through FAR 9.505-4.

IARPA generally prohibits contractors/Performers from concurrently providing Scientific Engineering Technical Assistance (SETA), Advisory and Assistance Services (A&AS) or similar support services and being a technical Performer. Therefore, as part of the FAR 9.5 disclosure requirement above, address whether an Offeror or an Offeror’s team member (e.g., sub awardee, consultant) is providing SETA, A&AS, or similar support (e.g., T&E services) to IARPA under: (a) a current award or subaward; or (b) a past award or subaward.

If SETA, A&AS, or similar support is or was being provided to IARPA, the proposal must include:

- The name of the IARPA program or office receiving the support;
- The prime contract number;
- Identification of proposed team member (sub awardee, consultant) providing the support.

As part of their proposal, Offerors shall include either (a) a copy of their OCI notification including mitigation plan or (b) a written certification that neither they nor their subcontractor teammates have any potential conflicts of interest, real or perceived. A sample certification is provided in Appendix A.

The Government will evaluate OCIs and potential OCIs to determine whether they can be avoided, neutralized or mitigated and/or whether it is in the Government’s interest to grant a waiver. The Government will make OCI determinations, as applicable, for proposals that are otherwise selectable under the BAA Evaluation Factors.

The Government may require Offerors to provide additional information to assist the Government in evaluating OCIs and OCI mitigation plans.

If the Government determines that an Offeror failed to fully disclose an OCI; or failed to provide the affirmation of IARPA support as described above; or failed to reasonably provide additional information requested by the Government to assist in evaluating the Offeror’s OCI and proposed OCI mitigation plan, the Government may reject the proposal and withdraw it from consideration for award.

### **3.A.2 Multiple Submissions to the BAA**

Organizations may participate as a prime or subcontractor in more than one submission to the BAA. However, if multiple submissions to the BAA which include a common team member are selected, such common team members shall not receive duplicative funding (i.e., no one entity can be paid twice to perform the same task).

### **3.B. U.S. Academic Institutions**

According to Executive Order 12333, as amended, paragraph 2.7, “Elements of the Intelligence Community are authorized to enter into contracts or arrangements for the provision of goods or services with private companies or institutions in the United States and need not reveal the sponsorship of such contracts or arrangements for authorized intelligence purposes. Contracts or arrangements with academic institutions may be undertaken only with the consent of appropriate officials of the institution.”

Offerors must submit a completed and signed Academic Institution Acknowledgement Letter for each U.S. academic institution that is a part of their team, whether the academic institution is serving in the role of a prime, or a subcontractor or a consultant at any tier of their team with their technical proposal. Each Letter must be signed by a senior official from the institution (e.g., President, Chancellor, Provost, or other appropriately designated official). A template of the Academic Institution Acknowledgement Letter is enclosed in Appendix A of this BAA.

Note that DOI shall not enter into negotiations with an Offeror whose team includes a U.S. academic institution until all required Academic Institution Acknowledgment Letters are received.

### **3.C. Other Eligibility Criteria**

#### **3.C.1 Collaboration Efforts**

Collaborative efforts and teaming arrangements among potential Offerors are strongly encouraged. Specific content, communications, networking and team formations are the sole responsibility of the participants.

## **SECTION 4: WHITE PAPER AND PROPOSAL SUBMISSION INFORMATION**

This notice constitutes the full solicitation package and contains all information required to submit a proposal. No additional forms, kits, or other materials are required. This solicitation will be conducted in three steps:

**STEP ONE – White Paper Submission:** Interested Offerors are strongly encouraged to submit White Papers. White Papers will be accepted until the date listed in the General Information section at the beginning of this BAA. Offerors can submit a White Paper for Track-1 or Track-2. If Offerors are interested in submitting a White Paper for both technical tracks, Offerors must submit a separate White Paper for each. White Paper submission is not required to submit technical proposal in Step Two.

Offerors will receive a response to their White Paper by the date listed in the General Information Section of this BAA stating whether the Government encourages a proposal or does not encourage a proposal.

**STEP TWO – Volume 1, Technical and Management Proposal Submission:** Interested Offerors can submit Volume 1, Technical and Management proposal. In order to receive consideration for award, compliant proposals should be received by the proposal due date in the General Information section of the BAA. Proposals received after this date will not be considered and not be reviewed. If there are any subsequent rounds of selection, the BAA will be amended to notify Offerors and to provide the proposal due date for the next round of selections. Selection for award remains contingent on the technical and funding availability evaluation factors.

Offerors not encouraged to submit technical proposals, or Offerors that chose not to submit a white paper are still permitted to submit a technical proposal (see BAA Section 5). **Notice to Offerors – if there is a large number of Volume 1 proposals submitted, IARPA will prioritize review of Offerors that submitted encouraged White Papers versus Offerors that did not submit White Papers. As stated in Step One, White Paper submissions are strongly encouraged.** All proposals must be submitted by the due date listed in the General Information section of this BAA.

See Section 4.B of this announcement for further details regarding the proposal requirements.

Upon completion of evaluation, the Government will contact Offerors whose proposals are selected for negotiations and may request additional information required for award. The Government may establish a deadline for the close of fact-finding and negotiations that allows a reasonable time for the award of a contract. Offerors that are not responsive to Government deadlines established and communicated with the request may be removed from award consideration. Offerors may also be removed from award consideration should the parties fail to reach agreement within a reasonable time on contract terms, conditions, and cost/price.

**STEP THREE – Volume 2, Cost Proposal Submission:** This Volume is only required if the Offeror's proposal has been selected for negotiation. The notification of selection for negotiation will be issued in writing by the CO and will include a request to submit the full Cost Volume.

#### **4.A. White Paper Preparation Instructions**

White Papers shall not exceed 5-pages, summarizing Offeror's qualifications and intended technical approach/solution to the SOLSTICE objectives. Specifically, Offerors shall clearly describe the following:

1. What are you trying to do?
  - a. Provide a high-level SOLSTICE system design concept that meets the metrics set forth in this BAA. Offerors are encouraged to use visual aids (e.g. block diagrams and/or charts or other illustrations) to show their system design concept.
2. What is new about your approach? How does it address the limitations of present approaches?
  - a. Preliminary identification of the innovative component(s) and/or approach the Offerors envision to more fully develop in Phase 1 of the program with the intent to integrate into the full power system in Phase 2. Offerors should include key metrics that describe the current state of development and planned target performance of the component(s) by end of Phase 1.
3. If you are successful in your project, what difference will it make?
  - a. Rough order of magnitude (ROM) energy flows and/or loss accounting from energy collection to load output that demonstrates benefits of the approach.
4. What are the costs?
  - a. Preliminary ROM cost of the BAA for all three phases of the program (broken down by phase).

- b. Any anticipated unique testing and evaluation challenges/needs specific to their proposed concept(s).
- c. Anticipated Government Furnished Equipment, Capabilities, or Property Requests. (GFE, GFC, GFP).
5. High-level breakdown of anticipated team structure and function/role in the technical development work.
6. A preliminary assessment of key risks to successful delivery of concepts proposed in White Paper.

The White Paper shall not describe management nor detailed cost/price information other than high-level cost ROM for each phase. All White Papers shall be written in English. Additionally, text should be black and paper size 8-1/2 by 11-inch, white in color with 1" margins from paper edge to text or graphic on all sides. Submissions should also use Times New Roman font (or equivalent) with font size not smaller than 12 point. Additionally, the font size for figures, tables and charts should not be smaller than 10 point. All contents shall be clearly legible with the unaided eye or the white paper may not be considered. White papers shall be submitted in a portable document format (PDF).

The Government anticipates white papers submitted under this BAA will be UNCLASSIFIED.

All white papers shall be in the format given below. The Government reserves the right to reject a white paper without review if the information requested below is not adequately addressed.

An Offeror can submit multiple white papers.

#### **4.A.1 White Paper Structure**

- Cover Sheet - Offerors will be prompted by IARPA's electronic proposal submittal system, IDEAS (see BAA Section 4.D.2), to complete a white paper cover sheet. It will also prompt Offerors to insert a cost/price. In this case, please include a rough order of magnitude for project cost as a placeholder, as cost/price will not be assessed as part of the white paper review. Offeror's will also be prompted to indicate whether they have any objections to non-Government personnel reviewing their white paper (see BAA Section 4B). This system generated cover sheet is not included in the white paper page count. **Note: In addition to the system generated cover sheets, proposals require additional cover sheets for the Technical/Management Volume, which are included in BAA Appendix A. This additional cover sheet is not required for the white paper.**
- Responses to requested information in Section 4.A (above)

White Papers shall not exceed 5 pages.

#### **4.B. Proposal Information**

Interested Offerors are required to submit full proposals (Volume I, initially and Volume 2, if requested) in order to receive consideration for an award. Compliant proposals shall be received by the time and date specified in the BAA, General Information, item 8.4, **Proposal Due Date for Initial Round of Selections**, in order to be considered in the initial round. Selection for award remains contingent on the technical and funding availability evaluation factors. Proposals received after the BAA Closing Date are deemed to be late and will not be evaluated.



The Government intends to use Booz Allen Hamilton, Navstar Inc., SERCO, Inc., Airlin Technologies Inc., ALKU, Advanced Technology Consulting, Site Works, TekMasters, TENICA Global Solutions, the Infusement Group, Bluemont Technology and Research, Crimson Phoenix, MBO Partners, Inc. and IMSolutions LLC to provide expert advice, regarding portions of the white papers and proposals submitted to the Government and to provide logistical support in carrying out the evaluation process. These entities should be considered as part of an Offeror's OCI disclosure.

In addition to supporting evaluations, the following entities: Johns Hopkins University Applied Physics Laboratory, LLC, NREL, and the NASA Jet Propulsion Laboratory will be supporting T&E activities for contracts awarded under this program and should also be considered as part of an Offeror's OCI disclosure.

All Government and Contractor personnel shall have signed and be subject to the terms and conditions of non-disclosure agreements. By submission of its proposal, an Offeror agrees that its white paper and proposal information may be disclosed to employees of these organizations for the limited purposes stated above. Offerors who object to this arrangement shall provide clear notice of their objection as part of their transmittal letter. If Offerors do not send notice of objection to this arrangement in their transmittal letter, the Government shall assume consent to the use of contractor support personnel in assisting the review of submittal(s) under this BAA.

Only Government personnel will make evaluation and award determinations under this BAA.

All unclassified correspondence and questions regarding this solicitation shall be directed by email to [IARPA\\_DOI\\_SOLSTICE@IBC.DOI.Gov](mailto:IARPA_DOI_SOLSTICE@IBC.DOI.Gov). White Papers and Proposals shall be submitted in accordance with the procedures stated in the BAA.

#### **4.C. Proposal Format and Content**

To facilitate the evaluation of the proposal, the government encourages Offerors to submit proposals which: are clear and concise; are limited to essential matters sufficient to demonstrate a complete understanding of the Government's requirements; include sufficient detail for effective evaluation; and provide a convincing rationale to address how the Offeror intends to meet these requirements and objectives, rather than simply rephrasing or restating the Government's requirements and objectives.

All proposals shall be in the format outlined below. Non-compliant proposals may be rejected without review. Proposals shall consist of "Volume 1 - Technical and Management Proposal" and, **only if requested** (see BAA sections 4.C.2 and 5.B.), "Volume 2 - Cost Proposal." All proposals shall be written in English.

Additionally, text should be black and paper size 8-1/2 by 11-inch, white in color with 1" margins from paper edge to text or graphic on all sides. Submissions shall use Times New Roman, Liberation Serif, or a metrically equivalent font with font size not smaller than 12-point. IARPA desires that the font size for figures, tables and charts not be smaller than 10-point. All contents shall be clearly legible with the unaided eye. Excessive use of small font, for other than figures, tables, and charts, or unnecessary use of figures, tables, and charts to present information may render the proposal non-compliant. Text and graphics, if applicable, may be printed on both sides of a sheet (double-sided). Front and backside of a single sheet are counted as two (2) pages if both sides are printed upon. Foldout pages are not permitted. The page limitation for full proposals includes all figures, tables, and charts. All pages should be numbered. No other materials may be incorporated in any portion of the proposal by reference, as a means to circumvent

page count limitations. All information pertaining to a volume shall be contained within that volume. Any information beyond the page limitations will not be considered in the evaluation of Offerors.

The Government anticipates proposals submitted under this BAA will be UNCLASSIFIED.

**Each proposal submitted in response to this BAA shall consist of the following:**

**Volume 1 – Technical & Management Proposal (See Section 4.C.1 below)**

Section 1 - Cover Sheet (see Appendix A) & Transmittal Letter (A Table of Contents is not required but if included, will not be considered in the page count)

Section 2 – Summary of Proposal

Section 3 – Detailed Proposal

Section 4 – Attachments (Not included in page count, but number appropriately for elements included. Templates are in the Appendices of this BAA)

1 – Academic Institution Acknowledgment Letter, if required (See 3.B and Appendix A)

2 – Intellectual Property (IP) Rights, estimated not to exceed 4 pages (See Appendix A)

3 – OCI Notification or Certification (See para 3.2 and Appendix A)

4 – Bibliography

5 – Relevant Papers (up to three)

6 – Consultant Letters of Commitment

7 – Human Use Documentation (see Section 6) – **(Not applicable)**

8 – Animal Use Documentation (see Section 6) – **(Not applicable)**

9 – A Three Chart Summary of the Proposal

10 – Security Plan, estimated not to exceed 5 pages - **(Not applicable)**

11 – Research Data Management Plan, estimated not to exceed 3 pages (see Section 4 and Template under Appendix A)

12 – Privacy Protection Plan, (See Section 1.D, no page limit)

13 – System Loss Efficiency Register spreadsheet. (See spreadsheet attached with this BAA on SOLSTICE SAM.gov posting. Template is required)

No research proposals involving human or animal subjects are anticipated under this BAA; however, proposals that include human and/or animal use testing must include an Attachment #7 and #8 Templates for Attachments 1-3, 9, 11 and 13 are in **Appendix A** of the BAA.

**Volume 2 – Cost Proposal (To be submitted only upon request of the Contracting Officer (CO), See BAA Sections 4.C.2 and 5.B)**

Section 1 – Cover Sheet (see Appendix B)

Section 2 – Estimated Cost Breakdown (see Appendix B)

Section 3 – Supporting Information

**4.C.1 Volume 1: Technical and Management Proposal**

Volume 1, Technical and Management Proposal, may include an attached bibliography of relevant technical papers or research notes (published and unpublished) which document the technical ideas and approach on which the proposal is based. Copies of not more than three relevant papers can be included

with the submission. Relevant papers will not count towards the 30 page technical volume, but should be submitted as additional attachments. Other supporting materials will not be reviewed. Except for the cover sheet, transmittal letter, table of contents (optional), and the required attachments stated in the BAA, the allowable page limits are as follows:

- **Not to exceed 30 pages. Note: a separate proposal submission is required for each technical track.**

Any pages exceeding these limits will not be considered during the evaluation process. Proposals shall be accompanied by an official transmittal letter, using contractor format.

#### **4.C.1.a Section 1: Cover Sheet & Transmittal Letter**

A. Cover sheet: (See Appendix A for template)

B. Transmittal Letter

The transmittal letter shall include the following (**not to exceed one page**):

Introduction of Offeror and team (subcontractors and consultants), the BAA number, IARPA program name, Offerors' Program name, the proposal validity period, the type contract vehicle being requested (procurement contract or other transaction) with a short rationale, any non-negotiable conditions on which the offer is based such as contract type (cost type, FFP), IP restrictions, etc., and the Offeror's points of contact information including: name, email and phone number for both technical and administrative issues.

**Note:** Any information required elsewhere in the proposal must be included in the appropriate section of the proposal (i.e., including the information in the transmittal letter alone may not be sufficient). If there is a conflict between the transmittal letter and the proposal, the proposal shall control.

#### **4.C.1.b Section 2: Summary of Proposal (see below for page limit)**

Section 2 shall provide an overview of the proposed work as well as introduce associated technical and management issues. This section shall contain a technical description of technical approach to the research as well as a succinct portrayal of the uniqueness and benefits of the proposed work. It shall make the technical objectives clear and quantifiable and shall provide a project schedule with definite decision points and endpoints.

- **Not to exceed 5 pages**

The Summary shall include the elements specified in the sections below:

- A. A technical overview of the proposed research and plan. This section is the centerpiece of the proposal and shall succinctly describe the proposed approach and research. The overview shall clearly articulate the approach and design, technical rationale, and constructive plan for accomplishment of technical objectives and deliverable production. The approach will be supported by basic, clear calculations. Additionally, proposals shall clearly explain the innovative claims and technical approaches that will be employed to meet or exceed each program metric along with an explanation outlining why the proposed approaches are feasible. Proposals must also clearly identify any technical uncertainties and potential mitigations. The use of non-standard terms and acronyms should be avoided. This section shall be supplemented with a more detailed plan in Volume 1, Section 3 of the proposal.

- B. Summary of the products, transferable technology and deliverables associated with the proposed research results. Define measurable deliverables that show progress toward achieving the stated program milestones. All proprietary claims to the results, prototypes, IP, or systems supporting and/or necessary for the use of the research, results, and/or prototype shall be detailed in Attachment 2. Government assumes that all deliverables will be delivered to the USG with Unlimited Rights or at a minimum Government Purpose Rights in accordance with FAR 52.227-14.
- C. Schedule and milestones for the proposed research. Summarize, in table form the schedule and milestones for the proposed research. Do not include proprietary information with the milestone chart.
- D. Related research. Include a general discussion of other research in this area, comparing the significance and plausibility of the proposed innovations against competitive approaches to achieve Program objectives.
- E. Project contributors. Include a clearly defined organizational chart of all anticipated project participants and affiliations (e.g., subcontractor, consultant), organized under functional roles for the effort, along with the associated task number responsibilities for each individual. Demonstrate that the proposed Key Personnel/Principal Investigator are sufficiently dedicated to the project.
- F. Technical Resource Summary: (NOTE: The full Cost Volume **is not** required unless requested by the Contracting Officer (CO); therefore, it is critical that Offerors address the items below in their **technical proposal** so the Government can evaluate Resource Realism.)
- Summarize the total level of effort by labor category/technical discipline (e.g., Research scientist/chemist/physicist/engineer/administrative) and affiliation (e.g., prime/subcontractor/ consultant). All Key Personnel and significant contributors shall be identified by name. Provide a brief description of the qualifications for each labor category/technical discipline (e.g., education, certifications, years of experience).
  - Summarize level of effort by labor category/technical discipline for each major task.
  - Identify software and IP required for performance, by affiliation. List each item separately, identifying the task number for which the software or IP is required and the Performer team requiring it.
  - Identify materials or equipment (such as IT) required for performance. List each item separately, identifying the task number for which the material or equipment is required and the Performer team requiring it.
  - Identify any other resources required to perform (e.g., services, data sets, data set repository, facilities, Government furnished property). List each item separately, identifying the task number for these other resources are required and the Performer team requiring it.
  - Estimated travel, including purpose of travel and number of personnel per trip, by affiliation. (See Appendix B.4 for sample template)

The above information shall cross reference to the tasks set forth in the Offeror's statement of work, and shall be supported by the detailed cost and pricing information provided in the Offeror's Volume 2 Cost Proposal, the latter of which shall be submitted only if requested.

#### **4.C.1.c Section 3: Detailed Proposal Information**

This section of the proposal shall provide the detailed, in-depth discussion of the proposed research as well as supporting information about the Offeror's capabilities and resources. Specific attention shall be given to addressing both the risks and payoffs of the proposed research and why the proposed research will achieve the goals, objectives, metrics, and milestones in this BAA. The Government reserves the right to reject a proposal if the information requested below is not adequately addressed. This part shall provide:

- A. Statement of Work (SOW) (See Appendix A for Sample Format) - Clearly define the technical tasks and sub-tasks to be performed, their durations and the dependencies among them. For each task and sub-task, provide:
- A general description of the objective;
  - A detailed description of the approach to be taken, developed in an orderly progression and in enough detail to establish the feasibility of accomplishing the goals of the task;
  - Identification of the primary organization responsible for task execution (prime, sub-contractor, team member, etc.) by name;
  - The exit criteria for each task/activity (i.e., a product, event or milestone that defines its completion); and
  - Identification of all deliverables (e.g., data rights, reports, software) to be provided to the Government.

**Note: Do not include any proprietary information in the SOW**

At the end of this section of the proposal, provide a Gantt chart, showing all the tasks and sub-tasks on the left (grouped by research thrust, if applicable) with the performance period (in years/quarters) on the right. All milestones shall be clearly labeled on the chart. If necessary, use multiple pages to ensure legibility of all information.

- B. A detailed description of the objectives, scientific relevance, technical approach and expected significance of the work. Clearly identify the key elements of the proposed work and how they relate to each other. Describe the technical methods or approaches that will be used to meet or exceed each program milestone along with an explanation outlining why the proposed methods/approaches are feasible. Additionally, describe any anticipated risks along with possible mitigations. Proposals containing only a general discussion of the problem without detailed description of approaches, plausibility of implementation, and critical metrics may be deemed not selectable.
- C. State-of-the-art. Compare with the proposed approach to other on-going research, highlighting the uniqueness of the proposed approach and differences between the proposed effort and the current

state-of-the-art. Identify advantages and disadvantages of the proposed work with respect to potential alternative approaches.

- D. Data sources. Identify and describe data sources to be utilized in pursuit of the stated research goals.

Offerors proposing to use existing data sets shall provide written verification that said data sets were obtained in accordance with U.S. laws and, where applicable, use will be in compliance with End User License Agreements, Copyright Laws, Terms of Service, and laws and policies regarding privacy protection of U.S. Persons. Offerors proposing to obtain new data sets shall ensure that their plan for obtaining the data complies with U.S. Laws and, where applicable, with End User License Agreement, Copyright Laws, Terms of Service, and laws and policies regarding privacy protection of U.S. Persons. Offerors shall also address IP restrictions on the use or transfer of such data sets, in Attachment 2 of the Offeror’s proposal, as described in Section 4.C.1.d.

Offerors shall also include the documentation required in 6.B.3 (Human Use) in Attachment 7.

Documentation must be well written and logical; claims for exemptions from Federal regulations for human subject protection must be accompanied by a strong defense of the claims. The Human Use documentation and the written verification are not included in the total page count.

- E. Deliverables. Based on the required deliverables identified in Section 1 of the BAA, clearly identify the data to be delivered, including technical data and computer software. In Attachment 2 to Offeror’s proposal, Offerors shall address IP rights in such data, as described in Section 4.B.1.d.
- F. Cost, schedule, milestones. Describe the cost, schedule, and milestones for the proposed research, including cost estimates by cost element for base period, the option period(s) and the total program summary, and company cost share, if any, as well as costs by technical area(s) and tasks (see tables below for sample format). The milestones shall not include proprietary information (Offeror can use their own format for milestones).

**(Note: The full Volume 2 - Cost Proposal is not required unless requested by the CO; therefore, it is critical that Offerors address this element in their technical proposal so the Government can evaluate funding availability. See BAA Sections 4.C.2, 5.A., and 5.B).**

**SAMPLE FORMAT**

<b>Cost Element (burdened)</b>	<b>Phase 1- Base (18 Months)</b>	<b>Phase 2 – Option 1 (18 Months)</b>	<b>Phase 3 – Option 2 (12 Months)</b>	<b>Total Program Summary</b>
Labor				
Subcontracts/Consultant				
Materials & Equipment				
Travel				
Other Direct Costs				
(Cost Share, if any)				
Total				

- G. Offeror’s previous accomplishments. Discuss previous accomplishments and work in this or closely related research areas and how these will contribute to and influence the current work.
- H. Facilities. Describe the facilities that shall be used for the proposed effort, including computational and experimental resources.
- I. Detailed Management Plan. Provide the Management Plan that clearly identifies both organizations and individuals within organizations that make up the team, and delineate the expected duties, relevant capabilities, and task responsibilities of team members and expected relationships among team members. Identify the expected levels of effort (percentage time, or fraction of an FTE) for all Key Personnel and significant contributors. Additionally, include a description of the technical, administrative, and business structure of the team along with an internal communications plan. Describe project/function/sub-contractor relationships (including formal teaming agreements), Government research interfaces, and planning, scheduling, and control practices utilized, as well as the team leadership structure. Provide a brief biography of all Key Personnel (including alternates, if desired) and significant contributors who shall be involved in the research along with the amount of effort to be expended by each person during the year. Participation by all Key Personnel and significant contributors is expected to exceed 25% of their time. A compelling explanation is required for any variation from this figure.

If the team intends to use consultants, they shall also be included in the organizational chart with an indication of whether the person shall be an “individual” or “organizational” consultant (i.e., representing themselves or their organization), and organizational affiliation.

See Table 7 below for the recommended format.

**Table 7: Team Organization (Example)**

Participants	Org	Role	Unique, Relevant Capabilities	Role: Tasks	Time
Jane Wake	LMN Univ.	PI/Key Personnel	Electrical Engineering	Program Mgr & Electronics: 10	100%
John Weck, Jr.	OPQ Univ.	Key Personnel	Mathematical Physics	Programming: 1-5	50%
Dan Wind	RST Univ.	Key Personnel	Physics	Design, Fab, and Integration: 6-8	90%
Katie Wool	UVW Univ.	Contributor	Quantum Physics	Enhancement witness design: 4	25%
Rachel Wade	XYZ Corp.	Co-PI/Key Personnel	Graph theory	Architecture design: 6	55%
Chris West	XYZ Corp.	Significant Contributor	EE & Signal Processing	Implementation & Testing: 8-9	60%
Julie Will	JW Cons.	Consultant (Individual)	Computer science	Interface design: 10	200 hours
David Word	A Corp.	Consultant (A. Corp.)	Operations Research	Applications Programming: 2-3	200 hours

- J. Resource Share. Include the type of support, if any, the Offeror might request from the Government, such as facilities, equipment, materials, or any such resources the Offeror is willing to provide at no additional cost to the Government to support the research effort. Cost sharing is not required from Offerors and is not an evaluation criterion but is encouraged where there is a reasonable probability of a potential commercial application related to the proposed research and development effort.
- K. The names of other federal, state or local agencies or other parties receiving the proposal and/or funding the proposed effort. If none, state “None”. Concurrent submission of the proposal to other organizations will not prejudice its review but may impact IARPA’s decision to fund the effort. See 5.A.2.a.
- L. Research Data Management Plan. (RDMP). Submit a RDMP that outlines how the Offeror will manage and preserve the Research Data, as defined below, collected or produced through the course of performance. The RDMP need not require the preservation of all Research Data: Offerors shall consider the cost and benefits of managing and preserving the Research Data in determining whether to preserve it. At a minimum, all Research Data associated with a peer-reviewed manuscript or final published article (hereinafter “Publications”) must be made publicly accessible by the award recipient before, on or at a reasonable time after the publication date. The Publications whose associated data must be covered by the RDMP are deliverables as described in Section 1.

Research Data is defined herein as the digital recorded factual material commonly accepted in the scientific community as necessary to validate research findings including data sets used to support scholarly publications, but does not include laboratory notebooks, preliminary analyses, drafts of scientific papers, plans for future research, peer review reports, communications with colleagues, or physical objects, such as laboratory specimens.

The RDMP must address the following:

- Describe the types of Research Data collected or produced in the course of the project. Include standards to be used for Research Data and metadata content and format.
- A plan for making the Research Data that underlie Publications digitally accessible to the public before or, at the time of publication or conference presentation, or within a reasonable time after publication. The requirement could be met by including the data as supplementary information to the Publication or by depositing the Research Data in a searchable, machine-readable and digitally accessible form suitable for repositories available to the public free of charge. Such repositories could be discipline-specific repositories, general purpose research data repositories or institutional repositories. The published article or conference paper should indicate how the public may access Research Data underlying the paper’s results and findings. Offerors should attempt to make the Research Data available for at least three years after published article or conference. (NOTE: Offerors shall make a best effort in identifying research data sets that may be used for Publications that occur after contract end. The Offeror shall deliver these data sets to the Government and make them available in repositories available to the public prior to the



end of the period of performance, if not included as supplementary information to Publications.)

- Policies and provisions for sharing and preservation, including a) policies and provisions for appropriate protection of privacy, confidentiality, security, and IP, b) descriptions of tools, including software, needed to access and interpret the Research Data, and c) policies and provisions for re-use, re-distribution, and production of derivatives.
- If, for legitimate reasons (e.g., privacy, confidentiality, security, IP rights considerations; size of data sets, cost; time), the Research Data underlying the results of peer-reviewed publications or conference papers cannot be shared and preserved, the plan must include a justification citing such reasons.

In addressing these elements (e.g., types of data to be shared and preserved, standards to be used for data and metadata, repositories to be used for archiving data, timeframes for sharing and preservation), the RDMP should reflect the best practices of the relevant scientific discipline and research community. At a minimum, Research Data underlying Publications and associated metadata shall include an acknowledgement of IARPA support and a link to the associated Publication.

#### **4.C.1.d Section 4: Attachments**

[NOTE: The attachments listed below shall be included with the proposal, if applicable, but do not count against the Volume 1-page limit.]

**Attachment 1:** Signed Academic Institution Acknowledgement Letter(s) (if applicable). A template is provided in Appendix A.

**Attachment 2:** IP Rights. A template is provided in Appendix A. This attachment is estimated not to exceed 4 pages and shall address the following:

**Representation as to Rights.** An Offeror shall provide a good faith representation that they either own or have sufficient licensing rights to all IP that will be utilized under their proposal.

**Program-Specific IP Approach.** IARPA requires sufficient rights to IP developed or used in the conduct of the proposed research to ensure that IARPA can successfully (a) manage the program and evaluate the technical output and deliverables, (b) communicate program information across Government organizations, and (c) support transition to and further use and development of the program results by IC users and others. IARPA anticipates that achieving these goals for the SOLSTICE program will necessitate a minimum of Government Purpose Rights, with Unlimited Rights preferred in all deliverables. However, there may be any number of other approaches to intellectual property rights to achieve IARPA's program goals. As outlined in FAR 52.227-14, "Unlimited rights" means the rights of the Government to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose, and to have or permit others to do so. In addressing their approach to IP rights, Offerors should (1) describe the intended use of patented invention(s) or data, including, technical data and computer software, in the conduct of the proposed research; (2) describe the rights being offered to the Government along with a justification if less than Unlimited Rights is being offered; (3) explain how IARPA will be able to reach its program goals (including transition) with the rights offered to the Government; (4) identify the cost to the Government to acquire additional or alternative rights

beyond those being offered, if applicable; and (5) provide possible alternatives in any area in which the offered rights may be insufficient for IARPA to achieve its program goals (e.g., the possibility of future licensing of privately-developed software to U.S. Government agencies at a reasonable cost.)

**Patented Inventions.** Offerors shall include documentation using the format provided in Appendix A, proving ownership of or sufficient rights to all inventions (or inventions for which a patent application has been filed) that will be utilized under the proposal for the IARPA program. If a patent application has been filed for an invention that the proposal intends to utilize, but the application has not yet been made publicly available and contains proprietary information, the Offeror may provide only the serial number, inventor name(s), assignee names (if any), filing date, filing date of any related provisional application, and a summary of the patent title, together with either: (1) a representation that the Offeror owns the invention, or (2) proof of sufficient licensing rights in the invention. Offerors shall also indicate their intention to incorporate patented technology into any deliverable- i.e., if Offerors intend for any deliverable to embody any invention covered by any patent or patent application the Offerors listed in Volume 1, Attachment 2, Offerors shall also specify in the Attachment the deliverable into which the Offerors expects to incorporate the invention. In doing so, the Government requests that Offerors further specify any rights offered to the Government for inventions that will be utilized in the program (beyond the implied license that accompanies a patent owner's sale of a patented product).

**Noncommercial Data.** Offerors shall identify all noncommercial data, including technical data and computer software, that it plans to generate, develop and/or deliver under any proposed award instrument in which the Government shall acquire less than unlimited rights. In doing so, Offerors must assert (a) the specific restrictions the Government's rights in those deliverables, (b) the basis for such restrictions, (c) the intended use of the technical data and noncommercial computer software in the conduct of the proposed research and development of applicable deliverables, and (d) a supporting rationale of why the proposed approach to data rights is in the Government's best interest (please see program specific goals above). **If no restrictions are intended, then the Offeror shall state "NONE."**

**Commercial Data.** Offerors shall identify all commercial data, including technical data and commercial computer software, that may be included in any deliverables contemplated under the research effort and assert any applicable restrictions on the Government's use of such commercial data (please see program specific goals above). **If no restrictions are intended, then the Proposer shall state "NONE."**

**Data Developed with Mixed Funding.** If mixed funding is anticipated in data generated, developed, and/or delivered under the research effort, the Government seeks at minimum "Government Purpose Rights" (GPR) for all noncommercial data and software deliverables; offering anything less shall be considered a weakness in the proposal. United States Government purposes include any activity in which the United States Government is a party, including cooperative agreements with international or multi-national defense organizations, or sales or transfers by the United States Government to foreign governments or international organizations. Government purposes include competitive procurement, but do not include the rights to use, modify, reproduce, release, perform, display, or disclose technical data or computer software for commercial purposes or authorize others to do so. Government Purpose Rights continue for a five-year period upon execution of the contract, and upon expiration of the five-year period, the Government obtains Unlimited Rights in the data.

**Open Source.** If Offerors propose the use of any open-source data or freeware, any conditions, restrictions or other requirements imposed by that software shall also be addressed. Offerors should leverage the format in **Appendix A** for their response.

Identification of Relevant Government Contracts. For all technical data and computer software that an Offeror intends to deliver with other than unlimited rights that are identical or substantially similar to technical data and computer software that the Offeror has produced for, delivered to, or is obligated to deliver to the Government under any contract or subcontract, the Offeror shall identify (a) the contract number under which the data, software, or documentation was produced; (b) the contract number under which, and the name and address of the organization to whom, the data and software was most recently delivered or shall be delivered; and (c) any limitations on the Government's rights to use or disclose the data and software, including, when applicable, identification of the earliest date the limitations expire.

Definitions. For this solicitation, IARPA recognizes only the definitions of IP rights in accordance with the terms as set forth in the Federal Acquisition Regulation (FAR) part 27 or as defined herein. If Offerors propose IP rights that are not defined in FAR part 27 or herein, Offerors shall clearly define such rights in the "Intellectual Property Rights" Attachment of their proposal. Offerors are reminded of the requirement for prime contractors to acquire sufficient rights from subcontractors to accomplish the program goals.

Evaluation. The Government will use the asserted data rights during the evaluation process to evaluate the impact of any identified restrictions. The technical content of the "Intellectual Property Rights" Attachment shall include only the information necessary to address the proposed approach to IP; any other technical discussion in the attachment shall not be considered during the evaluation process.

**Attachment 3:** OCI Notification or Certification Template provided in Appendix A.

**Attachment 4:** Bibliography. A brief bibliography of relevant technical papers and research notes (published and unpublished) which document the technical ideas on which the proposal is based.

**Attachment 5:** Relevant Papers. Copies of not more than three relevant papers may be included in the submission. The Offerors shall include a one-page technical summary of each paper provided, suitable for individuals who are not experts in the field.

**Attachment 6:** Consultant Commitment Letters. If needed.

**Attachment 7:** Human Use Documentation; **(Not applicable)**

**Attachment 8:** Animal Use Documentation. **(Not applicable)**

**Attachment 9:** A Three Chart Summary of the Proposal. A PowerPoint summary that quickly and succinctly indicates the concept overview, key innovations, expected impact, and other unique aspects of the proposal. The format for the summary slides is included in Appendix A to this BAA and does not count against the page limit. Slide 1 should be a self-contained, intuitive description of the technical approach and performance. These slides may be used during the evaluation process to present a summary of the proposal from the Offeror's view.

**Attachment 10:** Security Plan. **(Not applicable)**

**Attachment 11:** RDMP (estimated as 2 to 3 pages). Template provided in Appendix A

**Attachment 12:** Privacy Plan, (reference section 1.D)

**Attachment 13:** Power System Efficiency Loss Register workbook. Template downloadable from the SAM.gov SOLSTICE web page. Instructions for completion are contained on the "Guidance &

Objectives” tab within the spreadsheet. All Offerors are required to complete this attachment as part of their proposal following the instructions contained therein. A complete attachment includes a system-specific efficiency & loss table tab as well as a figure/diagram on a separate tab that illustrates the energy flow. Examples of both required parts are found in separate tabs in the workbook. Offerors may modify the existing tabs to present their power system design or create their own tabs following the form and instructions presented in the example tabs provided.

#### **4.C.2 Volume 2: Cost Proposal (No Page Limit)**

**NOTE: This Volume is only required if the Offeror’s proposal has been selected for negotiation (see BAA Section 5.B and 5.C). The notification of selection for negotiation will be issued in writing by the CO and will include a request to submit the full Cost Volume within 10 business days or as otherwise authorized by the contracting officer.**

IARPA anticipates awarding cost-type procurement contracts. However, Offerors requesting other than a cost-type procurement contract (e.g., Firm Fixed Price (FFP) contract) may be directed by the CO to provide “other than certified cost or pricing data” (reference FAR Part 15.4) and/or cost supporting information in a different format than described below. The CO will determine whether to grant the request for other than a cost-type procurement contract.

Regardless of the type of instrument determined to be appropriate by the CO, the Offeror’s cost proposal shall contain sufficient factual information to establish the Offeror’s understanding of the project, the perception of project risks, the ability to organize and perform the work and to support the realism and reasonableness of the proposed cost, to the extent appropriate. IARPA recognizes that undue emphasis on cost may motivate Offerors to offer low-risk ideas with minimum uncertainty and to staff the effort with junior personnel in order to be in a more competitive posture. IARPA discourages such cost strategies. Cost reduction approaches that shall be received favorably include innovative management concepts that maximize direct funding for technology and limit diversion of funds into overhead.

##### **4.C.2.a Section 1: Cover Sheet**

See Appendix B for the Cover Sheet Template

##### **4.C.2.b Section 2: Estimated Cost Breakdown**

Offerors shall submit numerical cost and pricing data using Microsoft Excel. The Excel workbook, in the format provided in Appendix B, shall include intact formulas and shall not be hard numbered. The base and option period cost data should roll up into a total cost summary. The Excel files may be write-protected but shall not be **password protected**. The Cost/Price Volume shall include the following:

- A. Completed Cost/Price Template - Offerors shall submit a cost element breakdown for the base period, each option period and the total program summary in the format provided in Appendix B.
- B. Total cost broken down by major task.
- C. Major program tasks by fiscal year.

- D. A summary of projected funding requirements by month.
- E. A summary table listing all labor categories used in the proposal and their associated direct labor rates, along with escalation factors used for each base year and option year.
- F. A summary table listing all indirect rates used in the proposal for each base year and option year.

#### 4.C.2.c Section 3: Supporting Information

In addition to the above, supporting cost and pricing information shall be provided in sufficient detail to substantiate the Offeror's cost estimates. Include a description of the basis of estimate (BOE) in a narrative for each cost element and provide supporting documentation, as applicable:

Direct Labor – Provide a complete cost breakout by labor category, hours and rates (template available in Appendix B). Specify all Key Personnel by name and clearly state their labor category and proposed rate. Describe the basis of the proposed rates and provide a copy of the most recent Forward Pricing Rate Agreement (FPRA) and/or Forward Pricing Rate Recommendation (FPRR) with the Government. If Offerors do not have a current FPRA with the Government, provide payroll records or contingency hire letters with salary data to support each proposed labor category, including those for key individuals, and the most recent Forward Pricing Rate Proposal Submission, if applicable. Offeror should also address whether any portion of their labor rates is attributable to uncompensated overtime.

Labor Escalation Factor – State the proposed escalation rate and the basis for that rate (e.g., based upon Global Insight indices, Cost Index or historical data). If the escalation rate is based upon historical data, provide data to demonstrate the labor escalation trend for the last three years. Provide a sample calculation demonstrating application of the factor to direct labor.

Subcontracts (to include consultants and Inter-organizational Transfers (IOTs) – The Offeror is responsible for compiling and providing full subcontractor proposals with the Cost Volume. Subcontractor cost element sheets shall be completed for the base period, each option period and the total summary using the same format required for the prime contractor (See Appendix B). If available, provide a copy of the most recent Forward Pricing Rate Agreement (FPRA) and/or Forward Pricing Rate Recommendation (FPRR) with the Government. Consultant letter(s) of commitment shall also be attached.

Information shall be presented in Excel with intact formulas using the format provided in Appendix B and addressing the supporting cost information as outlined in Section 4 of the BAA. In addition to the full and complete subcontractor cost proposals, the Offeror shall also provide its analysis of each subcontractor's proposal including justification for why the subcontractor was selected and its determination that the cost/price is fair and reasonable (Reference FAR Part 44 and FAR clause 52.244-2). **If subcontractors have concerns about proprietary cost information, subcontractors can submit their detailed cost proposals directly to the CO.**

In accordance with FAR 15.404-3 Subcontract Pricing Considerations, prime contractors are required to submit with their cost proposal a cost analysis on why the subcontractor costs are fair and reasonable to the Government. This analysis will be reviewed by a Government contracting officer. The Government will make an independent determination on the fair and reasonableness of both the prime contractors' and subcontractors' costs.

Materials and Equipment – Provide copies of quotes, bill of materials, historical data or any other information including Offeror’s analysis to support proposed costs. If there are material and equipment cost proposed, then the cost offerors will be required to explain why the costs are necessary for the research solution to be performed. The proposed cost should be supported by valid quotes from vendors with the preference of the proposer submitting a comparison quote and explanation on why a specific vendor was selected.

Travel – The proposed travel supporting detail shall include destination and purpose of the trip, number of trips, number of travelers and days per trip and price per traveler in sufficient detail to verify the BOE. Proposed travel costs shall comply with the limitations set forth in FAR Part 31. (See Appendix B.4 for sample format).

Proposed conference travel must have an immediate, direct, and tangible benefit to the Government such as providing a deliverable at the conference (e.g., gives a presentation, presents a paper or research findings that are sponsored in whole or in part by IARPA). Travel for personnel to simply attend a conference will not be approved as a direct charge to the contract.

Any proposed travel costs should be calculated in accordance with the cost proposal template. Lodging and per diem rates are not allowed to exceed the rates shown on GSA.gov. Travel costs that are unable to be supported with a travel spreadsheet completed are likely to be disallowed.

Other Direct Costs (ODCs) – ODCs shall be listed separately and supported by quotes, historical data or any other information including the Offeror’s analysis. Offeror’s will be required to explain why the costs are necessary for the research solution to be performed.

Indirect Costs – The Offeror shall show indirect cost calculations, identify the proposed indirect rate by contractor fiscal year and program period (base, option period) and provide information on indirect cost pools and allocation bases for each year and program period involved. If a Government agency recently audited the Offeror’s indirect rates, the Offeror shall identify the agency that conducted the audit, when the rates were approved and the period for which they are effective. Include a copy of this rate agreement. Absent current Government rate recommendations, it is incumbent on the Offeror to provide some other means of demonstrating indirect rate realism (e.g., 3 years of historical actual costs with applicable pools and bases). If proposed rates vary significantly from historical experience, the Offeror shall explain of the variance. If there is not any rate information on file with DCAA or DCMA, then the offeror should be prepared to show how any indirect cost rates are calculated. A typical indirect cost rate calculation includes indirect cost pools and a base cost. If a cost offeror is not familiar with an indirect cost rate structure or is unable to provide the calculation that supports the rates, then the cost offeror is advised to consult with an accountant for assistance with this. This cost will not be able to be charged back to the Government as a direct cost under the proposal.

Cost sharing – Describe the source, nature and amount of cost-sharing, if any. Reference Resource Share from Section 4 of the BAA.

Other Pricing Assumptions – Identify all pricing assumptions that should be incorporated into the resulting award instrument (e.g., use of Government Furnished Property/Facilities/Information, access to Government Subject Matter Experts, etc.). Reference Resource Share from Section 4 of the BAA.

Facilities Capital Cost of Money (FCCM) – If proposing FCCM, the Offeror shall show FCCM cost calculations, identify the proposed FCCM factors by contractor fiscal year and program year and provide a copy of the Forward Price Rate Agreement (FPRA), Forward Price Rate System (FPRS) or Forward

Pricing Rate Recommendation (FPRR), if available. If proposing FFCM, the Offeror must submit a DD1861 to support the evaluation of the cost proposal.

Profit/Fee – Identify the proposed profit or fee percentage and the proposed profit/fee base. Provide justification for your proposed profit or fee.

Systems – For the systems listed below, provide a brief description of the cognizant federal agency and audit results. If the system has been determined inadequate, provide a short narrative describing the steps your organization has taken to address the inadequacies and the current status. If a formal audit has been performed by a Government Agency, please provide a complete copy of the audit report or adequacy determination letter. If the system has never received a formal Government review and approval include a statement to that effect. Address whether your organization has contracts that are Cost Accounting Standards (CAS) covered and if so, whether they are subject to full or modified CAS coverage.

- Accounting system
- Purchasing system
- Estimating System

Certified “cost or pricing data” may be requested for procurement contract awards that exceed the threshold for submittal as set forth in the FAR, unless the CO approves an exception from the requirement to submit cost or pricing data. (Reference FAR Part 15.403.)

#### **4.D. Submission Details**

##### **4.D.1 Due Dates**

See BAA General Information Section for White Paper and Proposal due dates and times.

##### **4.D.2 White Paper and Proposal Delivery**

White Papers and Proposals (Volume 1 **initially**) shall be submitted electronically through the IARPA Distribution and Evaluation System (IDEAS). Offerors interested in providing a submission in response to this BAA shall first register by electronic means in accordance with the instructions provided on the following web site: <https://iarpa-ideas.gov>. Offerors who plan to submit White Papers and/or Proposals for evaluation are strongly encouraged to register at least one week prior to the due date for the first round of proposals. Offerors who do not register in advance do so at their own risk, and IARPA shall not extend the due date to accommodate such Offerors. Failure to register as stated shall prevent the Proposer’s submittal of documents.

After registration has been approved, Offeror’s should upload a White Paper or Proposal, (initially Volume 1 only), scanned certifications and permitted additional information in ‘pdf’ format, or as otherwise directed (Excel, PowerPoint, etc.). Offerors are responsible for ensuring a compliant and timely submission of their White Papers and Proposals to meet the BAA submittal deadlines. Time management to upload and submit is wholly the responsibility of the Offeror.

**Note: IDEAS will require Offerors to complete a proposal cover sheet within IDEAS at the time that the White Paper and/or Volume 1 – Technical and Management Proposal is submitted. This is**

**separate and distinct from the Technical and Cost Volume cover sheets referenced in 4.C.1.a. and 4.C.2.a. (also provided in Appendices A and B). Information requested within IDEAS will include basic cost information (Total funds requested from IARPA, proposed costs by option period and validity period). Please complete the requested information but DO NOT upload your Volume 2 – Cost Proposal. Directions for submittal of Volume 2 – Cost Proposal will be provided by the CO when Offerors are notified of selection for negotiations.**

Upon completing the proposal submission, the Offeror shall receive an automated confirmation email from IDEAS. Please forward that automated message to [IARPA\\_DOI\\_SOLSTICE@IBC.DOI.Gov](mailto:IARPA_DOI_SOLSTICE@IBC.DOI.Gov), [Frank\\_Kennedy@ibc.doi.gov](mailto:Frank_Kennedy@ibc.doi.gov) and [Brian\\_kehoe@ibc.doi.gov](mailto:Brian_kehoe@ibc.doi.gov).

IARPA and DOI strongly suggests that the Offeror document the submission of their proposal package by printing the electronic receipt (time and date stamped) that appears on the final screen following compliant submission of a proposal to the IDEAS website.

White Papers and/or Volume 1 submitted by any means other than IDEAS (e.g., hand-carried, postal service, commercial carrier and email) shall not be considered unless the Offeror attempted electronic submittal, but was unsuccessful and notified the Government using the following procedure. The Offeror shall send an e-mail to [IARPA\\_DOI\\_SOLSTICE@IBC.DOI.Gov](mailto:IARPA_DOI_SOLSTICE@IBC.DOI.Gov) [Frank\\_Kennedy@ibc.doi.gov](mailto:Frank_Kennedy@ibc.doi.gov) and [Brian\\_Kehoe@ibc.doi.gov](mailto:Brian_Kehoe@ibc.doi.gov), prior to the proposal due date and time specified in the BAA and indicate that an attempt was made to submit electronically, and that the submittal was unsuccessful. This e-mail shall include contact information for the Offeror. Upon receipt of such notification, the Government will provide additional guidance regarding submission.

Volume 1 shall be submitted by the date and time specified in the BAA General Information section in order to be considered in the initial round. It is in IARPA's sole discretion whether to evaluate proposals received after this date but before the BAA Closing Date set forth in the BAA General Information section. Selection remains contingent on the technical and funding availability evaluation factors. Proposals received after the BAA Closing Date are deemed to be late and will not be reviewed. Failure to comply with the submission procedures may result in the submittal not being evaluated.

Although classified proposals are not anticipated for this program, if an Offeror chooses to submit a classified proposal, the Offeror must first contact DOI via [IARPA\\_DOI\\_SOLSTICE@IBC.DOI.Gov](mailto:IARPA_DOI_SOLSTICE@IBC.DOI.Gov) [Frank\\_Kennedy@ibc.doi.gov](mailto:Frank_Kennedy@ibc.doi.gov) and [Brian\\_Kehoe@ibc.doi.gov](mailto:Brian_Kehoe@ibc.doi.gov) for detailed submittal instructions. In no case shall classified information be uploaded into IDEAS.

#### **4.E. Funding Restrictions**

Facility construction costs are not allowable under this activity. Funding may not be used to pay for commercialization of technology.

### **SECTION 5: WHITE PAPER AND PROPOSAL REVIEW INFORMATION**

#### **White Papers:**

White papers will be reviewed by Government Technical expert(s) to encourage Offerors' solutions that appear to meet the intent of the BAA. This determination will be based on the Offeror presenting technical qualifications specific to the field of science and technology needed for the technical approach/solution



presented, and the Government's interest in the Offeror's intended technical approach/solution. Program balance across Topics and/or program budget constraints may also be considerations in determining a reasonable number of Offerors encouraged to submit.

**The submission and response window for the white papers will close on the date indicated in the BAA General Information section.**

Based on the above determination, Offerors will either be encouraged to submit a proposal or not encouraged to submit a proposal. **Note:** Offerors that did not submit a White Paper and Offerors that submitted a White Paper but were not encouraged to submit a proposal, may still submit a proposal. However, Offerors falling into either of these two categories accept the risk that their proposal may not be given the same priority for review as Offerors that were encouraged to submit a proposal. (see 5.B below)

### **Proposals:**

#### **5.A. Technical and Funding Availability Evaluation Factors**

The factors used to evaluate and select proposals for negotiation for this Program BAA are described in the following paragraphs. Because there is no common SOW, each proposal shall be evaluated on its own merits and its relevance to the Program goals rather than against other proposals submitted in response to this BAA. The proposals shall be evaluated based on technical and funding availability factors. These are of equal importance. Within the technical evaluation factor, the specific technical criteria are in descending order of importance, as follows: Overall Scientific and Technical Merit, Effectiveness of Proposed Work Plan, Contribution and Relevance to the IARPA Mission and Program Goal, Relevant Experience and Expertise, and Resource Realism. Specifics about the evaluation criteria are provided below.

Award(s) shall be made to an Offeror based on the technical and funding availability factors listed below, and subject to successful negotiations with the Government. Award shall not be made to Offeror(s) whose proposal(s) are determined not to be selectable. Offerors are cautioned that failure to follow submittal and proposal instructions may negatively impact their proposal evaluation or may result in rejection of the proposal for non-compliance.

#### **5.A.1 Technical Evaluation Factor (technical criteria listed below)**

##### **5.A.1.a Overall Scientific and Technical Merit**

Overall scientific and technical merit of the proposal is substantiated, including unique and innovative methods, approaches, and/or concepts. The Offeror clearly articulates an understanding of the problem to be solved. The technical approach is credible and includes a clear assessment of primary risks and a means to address them. The proposed research advances the state-of-the-art.

##### **5.A.1.b Effectiveness of Proposed Work Plan**

The feasibility and likelihood that the proposed approach will satisfy the Program's milestones and metrics are explicitly described and clearly substantiated along with risk mitigation strategies for achieving stated milestones and metrics. The proposal reflects a mature and quantitative understanding of the program milestones and metrics, and the statistical confidence with which they may be measured. Any Offeror

proposed milestones and metrics are clear and well-defined, with a logical connection to enabling Offeror decisions and/or Government decisions. The schedule to achieve the milestones is realistic and reasonable.

The roles and relationships of prime and sub-contractors are clearly delineated with all participants fully documented. Work plans shall demonstrate the ability to provide full Government visibility into and interaction with key technical activities and personnel, and a single point of responsibility for contract performance. Work plans shall also demonstrate that all Key Personnel and significant contributors have sufficient time committed to the Program to accomplish their described Program roles.

The requirement and rationale for and the anticipated use or integration of Government resources, including but not limited to all equipment, facilities, information, etc., are fully described including dates when such Government Furnished Property (GFP), Government Furnished Equipment (GFE), GFI or other similar Government-provided resources shall be required.

The Offeror's RDMP is complete, addressing the types of data to be collected or produced, describing how each type of data will be preserved and shared, including plans to provide public access to peer reviewed publications and the underlying Research Data, or provides justifiable rationale for not doing so.

If applicable, the Security Plan is sound and delineates a comprehensive plan to protect all aspects of the SOLSTICE Program objectives and technology from disclosure. The offeror's Security Plan for implementing and maintaining a security posture ensures compliance with the National Industrial Security Program Operating Manual (NISPO) and applicable Intelligence Community Directives (ICDs).

The Privacy Plan reasonably addresses the requirements to protect personally identifiable information (PII) and United States Persons (USP) information, and safeguard the security of any personal data.

#### **5.A.1.c Contribution and Relevance to the IARPA Mission and Program Goal**

The proposed solution meets the letter and intent of the stated program goals and all elements within the proposal exhibit a comprehensive understanding of the problem. The Offeror clearly addresses how the proposed effort shall meet and progressively demonstrate the Program goals. The Offeror describes how the proposed solution contributes to IARPA's mission to invest in high-risk/high-payoff research that can provide the U.S. with an overwhelming intelligence advantage.

The Offeror's proposed IP and data rights are consistent with the Government's need to be able to effectively manage the program and evaluate the technical output and deliverables, communicate program information across Government organizations and support transition to and further use and development of the program results by IC users and others at a reasonable cost that is acceptable to the Government. The proposed approach to IP rights is in the Government's best interest.

#### **5.A.1.d Relevant Experience and Expertise**

The Offeror's capabilities, related experience, facilities, techniques, or unique combination of these, which are integral factors for achieving the proposal's objectives, shall be evaluated, as well as qualifications, capabilities, and experience of all Key Personnel and significant contributors critical in achieving the program objectives.

#### **5.A.1.e Resource Realism**

The proposed resources demonstrate a clear understanding of the program, a perception of the risks and the Offeror's ability to organize and perform the work. The labor hours and mix are consistent with the technical approach and are realistic for the work proposed. Material, equipment, software, data collection

and management, and travel, especially foreign travel, are well justified, reasonable, and required for successful execution of the proposed work.

## **5.A.2 Funding Availability Factor**

### **5.A.2.a Budget Constraints**

The Government will seek to maximize the likelihood of meeting program objectives within program budget constraints. This may involve awarding one or more contracts. **Note:** If the Offeror has submitted the proposal to other federal, state or local agencies or other parties that may fund the proposed effort, it may impact IARPA's decision to fund the effort.

### **5.A.2.b Program Balance**

The Government will consider IARPA's overall mission and program objectives, which may include but are not limited to the following: broadening the variety of technical approaches to enhance program outcomes, transitioning the technology to Government partners, developing capabilities aligned with the priorities of the IC and national security.

## **5.B. Method of Evaluation and Selection Process**

IARPA conducts impartial, equitable, comprehensive proposal reviews to select the source (or sources) whose offer meets the Government's technical, policy and programmatic goals. For evaluation purposes, a proposal is the document described in Section 4 of the BAA. Other supporting or background materials submitted with the proposal shall not be considered.

The Government anticipates more than one award. Additionally, the Government is not required to review proposals beyond those that were encouraged during the White Paper stage. Given the Government's limited resources, the Government, at its sole discretion, may prioritize proposals in the following order: 1) proposals that were encouraged by the Government during the White Paper stage, 2) proposals for which a White Paper was not submitted; and 3) proposals that were not encouraged during the White Paper stage. If the Government elects to review proposals for which a White Paper was not submitted or that were not encouraged during the White Paper stage, the Government may further prioritize based on program balance. IARPA may discontinue evaluating proposals due to budget constraints. If new funds become available, prior to proposal expiration, IARPA may restart proposal evaluations and issue additional selections/awards.

The contract award process for this BAA has two steps. The first step is selection for negotiations and is made based on the review of the technical and funding availability factors (see Section 5.A). The second step is negotiation and contract award. Contract award is contingent on CO determination of a fair and reasonable cost/price and agreement on terms and conditions.

Selection for negotiation will be conducted through a peer or scientific review process led by the PM. This process entails establishing a Scientific Review Panel (SRP) made up of qualified Government personnel

who will review and assess each proposal's strengths, weaknesses and risks<sup>7</sup> against the technical evaluation criteria. If necessary, non-Government technical experts with specialized expertise may advise Government panel members and the PM. However, only Government personnel will make selection recommendations and decisions under this BAA.

Proposals will be reviewed individually and will not be compared against each other as they are not submitted in accordance with a common SOW. When SRP reviews are complete, the PM will prepare a recommendation to the IARPA Scientific Review Official (SRO) identifying proposals as selectable, selectable with modification, or not selectable based on consideration of all stated factors (technical and funding availability factors). The SRO will make the final decision as to selectability for negotiations. At this point, Offerors will be notified in writing as to whether they have been determined selectable, selectable with modification, or not selectable.

### **5.C. Negotiation and Contract Award**

After selection and before award, the CO will contact Offerors whose proposals were selected or selected with modifications to engage in negotiations. At that time, the CO will also request a full cost proposal, as described in BAA Section 4.C.2. The CO will review the cost proposal using the proposal analysis techniques described in FAR 15.404-1, as appropriate, to determine a fair and reasonable cost. The CO's evaluation will include review of proposed anticipated costs/prices of the Proposer and those of associate, participating organizations, to ensure the Offeror has fully analyzed the budget requirements, provided sufficient supporting information, has adequate systems for managing the contract (accounting, purchasing), and that data is traceable and reconcilable. The CO will also determine whether the prospective contractor meets the responsibility standards of FAR Section 9.104. Additional information and supporting data may be requested.

If proposed costs submitted are substantially different than the estimates provided in the technical proposal, then a contract may not be awarded.

Procurement contracts shall be awarded to those Offerors whose proposals are deemed most advantageous to the Government, all stated evaluation factors considered, and pending the successful conclusion of negotiations.

### **5.D. Proposal Retention**

Proposals shall not be returned upon completion of the source selection process. The original of each proposal received shall be retained at DOI and IARPA and all other non-required copies shall be destroyed. A certification of destruction may be requested, provided that the formal request is sent to the DOI contracting agent via e-mail to [IARPA\\_DOI\\_SOLSTICE@IBC.DOI.Gov](mailto:IARPA_DOI_SOLSTICE@IBC.DOI.Gov), [mailto:Brian\\_Kehoe@ibc.doi.gov](mailto:Brian_Kehoe@ibc.doi.gov) and [Frank\\_Kennedy@ibc.doi.gov](mailto:Frank_Kennedy@ibc.doi.gov) within 5 days after notification of proposal results.

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<sup>7</sup> **Strength:** An aspect of an Offeror's proposal that has appreciable merit or appreciably exceeds specified performance or capability requirements in a way that will be advantageous to the Government during contract performance.

**Weakness:** A flaw in the proposal that increases the risk of unsuccessful contract performance.

**Risk:** The potential for unsuccessful contract performance. The consideration of risk assesses the degree to which an Offeror's proposed approach to achieving the technical factor or subfactor may involve risk of disruption of schedule, increased cost or degradation of performance, the need for increased Government oversight, and the likelihood of unsuccessful contract performance.

## **SECTION 6: AWARD ADMINISTRATION INFORMATION**

### **6.A. Award Notices**

As soon as practicable after the evaluation of a proposal is complete, the Offeror will be notified that: (1) its proposal has been selected for negotiations, or (2) its proposal has not been selected for negotiations.

### **6.B. Administrative and National Policy Requirements**

#### **6.B.1 Proprietary Data**

IARPA treats all proposals as proprietary information and will disclose their contents only for the purpose of evaluation. All proposals containing proprietary data shall have the cover page and each page containing proprietary data clearly marked as containing proprietary data. It is the Offeror's responsibility to clearly define to the Government what the Offeror considers proprietary data.

#### **6.B.2 Intellectual Property**

General. The Government may request additional information from the Offeror, as may be necessary, to evaluate the Offeror's IP rights assertions. If Offerors do not identify any restrictions with respect to a particular deliverable, the Government shall assume in its review of the proposal that the Government will have Unlimited Rights to all deliverables, technical data, and computer software generated under the contract in accordance with FAR 52.227-14. Further, failure to provide full information may result in a determination that the proposal is not compliant with the solicitation, and the Government reserves the right to reject a proposal if the Offeror does not appropriately address all required IP rights issues.

IP Ownership. Regardless of the scope of the Government's rights, Offerors may freely use data for their own commercial purposes unless restricted by the negotiated contract, U.S. export control laws or security classification. Therefore, data including technical data and computer software developed under any contract resulting from this solicitation may remain the property of the Offerors, subject to IARPA's rights as set forth in the contract. IARPA seeks the rights to technical data and/or computer software leveraged, developed, or used for the SOLSTICE program in accordance with FAR 52.227-14. For inventions first conceived or actually reduced to practice under for this effort, IARPA will obtain a nonexclusive, nontransferable, irrevocable, paid-up license to practice, or have practiced for or on its behalf, such invention throughout the world; Offeror may elect to retain title as described in FAR 52.227-11.

Indemnification. Offerors expecting to use, but not to deliver, data or patentable inventions, including commercial open-source tools in implementing their approach shall be required to indemnify the Government against legal liability arising from such use.

Technical Data – Withholding of Payment. If technical data specified to be delivered under a contract awarded under this solicitation is not delivered within the time specified by the contract or is deficient upon delivery (including having restrictive markings not specifically authorized by the contract), the CO is permitted, until such data are accepted by the Government, to withhold payment to the contractor of ten percent (10%) of the total contract price or amount unless a lesser withholding is specified in the contract. Payments may not be withheld, nor any other action taken pursuant to this paragraph when the contractor's

failure to make timely delivery or to deliver such data without deficiencies arises out of causes beyond its control and without fault or negligence of the contractor. The withholding of any amount or subsequent payment to the contractor shall not be construed as a waiver of any rights accruing to the Government under the contract.

### 6.B.3 Human Use

All research involving human subjects, to include use of human biological specimens and human data, selected for funding must comply with the federal regulations for human subject protection, namely 45 CFR Part 46, Protection of Human Subjects.

Institutions awarded funding for research involving human subjects must provide documentation of a current Assurance of Compliance with Federal regulations for human subject protection, for example a Department of Health and Human Services, Office of Human Research Protection Federal Wide Assurance (<http://www.hhs.gov/ohrp>). All institutions engaged in human subject research, to include subcontractors, must also have a valid Assurance. In addition to a local IRB approval, IARPA will review and approve the HSR documentation before HSR may begin. However, IARPA does not require a secondary review by a Government IRB.

For all proposed research that will involve human subjects, the institution must provide evidence of or a plan for review by an Institutional Review Board (IRB) with the final proposal submission to IARPA (reference Section 4.B.1.d). The IRB conducting the review must be the IRB identified on the institution's Assurance. The informed consent document must comply with federal regulations (45 CFR Part 46).

**Note: Due to the sensitive nature of this program, Offerors are NOT to submit any Human Subject Research protocols to any external IRBs, even if the study's activities would be considered entirely unclassified, without prior IARPA approval.**

The amount of time required to complete the IRB review/approval process may vary depending on the complexity of the research and/or the level of risk to study participants. Ample time should be allotted to complete the approval process. No IARPA funding can be used towards human subject research until ALL approvals are granted.

In limited instances, human subject research may be exempt from Federal regulations for human subject protection, for example, under Department of Health and Human Services, 45 CFR 46.101(b). Offerors claiming that their research falls within an exemption from Federal regulations for human subject protection must provide written documentation with their proposal that cites the specific applicable exemption and explains clearly how their proposed research fits within that exemption.

The process of obtaining informed consent must comply with the requirements of 45 CFR 46.116. The documentation of informed consent must comply with 45 CFR 46.117. The following link may help in the development of an approach and proposed language by investigators for obtaining consent that informs the IRB's approval. See <https://www.hhs.gov/ohrp/regulations-and-policy/guidance/informed-consent-tips/index.html>.

- Situate and contextualize your data to anticipate privacy breaches and minimize harm. The availability or perceived publicness of data does not guarantee lack of harm, nor does it mean that data creators consent to researchers using their data. R&D performers must develop a **Data Protection Plan** to safeguard any data resources throughout the program and the data life cycle.

When assessing privacy risk, researchers must address the extended ecosystem of privacy risks. Assume that data will be repurposed and recombined with third-party datasets.

- All R&D performers must complete **privacy related training**.
- Researchers handling sensitive human data must address how they will **audit and ameliorate bias and fairness risks** specific to data analytics and machine learning models. Researchers have an obligation to act consistently with the duties for beneficence and justice.
- Subjects must have **diverse and inclusive members**, including race, gender, and cultural backgrounds.

#### **6.B.4 Animal Use**

No research proposals involving animal subjects shall be accepted under this BAA.

#### **6.B.5 Publication Approval**

It is anticipated that research funded under this Program shall be unclassified research that shall not require a pre-publication review. However, Offerors should note that pre-publication approval of certain information may be required if it is determined that its release may result in the disclosure of sensitive intelligence information. A courtesy soft copy of any work submitted for publication shall be provided to the IARPA PM and the Contracting Officer's Technical Representative (COTR) a minimum of 10 business days prior to release in any forum.

#### **6.B.6 Export Control**

(1) The Offeror shall comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 C.F.R. Parts 120 through 130, and the Export Administration Regulations (EAR), 15 C.F.R. Parts 730 through 799, and any amendments thereto, in the performance of this contract. In the absence of available license exemptions/exceptions, the Offeror shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of (including deemed exports) hardware, technical data, and software, or for the provision of technical assistance.

(2) The Offeror shall be responsible for obtaining export licenses, if required, before utilizing non-U.S. persons (as defined in the ITAR and EAR, as applicable) in the performance of this contract, including instances where the work is to be performed on-site at any Government installation (whether in or outside the United States), where the foreign person shall have access to export-controlled technologies, including technical data or software.

(3) The Offeror shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

(4) The Offeror shall appropriately mark all contract deliverables controlled by ITAR and/or EAR.

(5) The Offeror shall be responsible for ensuring that the provisions of this section apply to its sub-contractors.

(6) The Offeror may be required to certify knowledge of and intended adherence to these requirements in the representations and certifications of the contract.

#### **6.B.7 Subcontracting**

It is the policy of the Government to enable small business and small disadvantaged business concerns to be considered fairly as sub-contractors to contractors performing work or rendering services as prime contractors or sub-contractors under Government contracts and to assure that prime contractors and sub-contractors carry out this policy. Each Offeror that is selected for negotiation for award and is expected to be awarded a contract which exceeds the simplified acquisition threshold may be asked to submit a sub-contracting plan before award in accordance with FAR 19.702(a) (1). The plan format is outlined in FAR 19.704.

Offerors shall declare teaming relationships in their Technical and Cost proposals and shall specify the type of teaming arrangement in place, including any exclusive teaming arrangements. IARPA neither promotes nor discourages the establishment of exclusive teaming agreements within Offeror teams. Individuals or organizations associated with multiple teams shall take care not to over-commit those resources being applied.

### **6.B.8 Reporting**

Fiscal and management responsibility are important to the Program. Although the number and types of reports shall be specified in the award document, all Offerors shall, at a minimum, provide the CO, COTR and PM with monthly technical reports and monthly financial reports. The reports shall be prepared and submitted in accordance with the procedures contained in the award document and mutually agreed upon before award. Technical reports shall describe technical highlights and accomplishments, priorities and plans, issues and concerns, evaluation results, and future plans. Financial reports shall present an on-going financial profile of the project, including total project funding, funds invoiced, funds received, funds expended during the preceding month, and planned expenditures over the remaining period. Additional reports and briefing material may also be required, as appropriate, to document progress in accomplishing program metrics.

The Offeror shall prepare and provide a research report of their work by month 18 for Phase 1, by month 36 for Phase 2 and by month 48 for Phase 3. The reports shall be delivered to the CO, COTR, and the PM. The reports shall include:

- Problem definition
- Findings and approach
- System design
- Possible generalization(s)
- Information on performance limitations and potential mitigation
- Anticipated path ahead
- Final identification of all commercial, third-party, or proprietary hardware, software, or technical data integrated into any deliverable and all applicable use restrictions.
- Any research products, including publications, data, and software, resulting from the project during the reporting period. The final report shall list in-progress scientific manuscripts and other research products.

### **6.B.9 System for Award Management (SAM)**



Selected Offerors will be required to register in the SAM system prior to any award under this BAA unless otherwise directed by the Contracting Officer. Information on SAM registration is available at <http://www.sam.gov>.

#### **6.B.10 Representations and Certifications**

Selected Offerors will be required to complete electronic representations and certifications at <http://www.sam.gov> and may also be required to complete additional representations and certifications prior to award, unless otherwise directed by the Contracting Officer.

#### **6.B.11 Lawful Use and Privacy Protection Measures**

All data gathered by the Offeror shall be obtained in accordance with U.S. laws and in compliance with the End User License Agreement, Copyright Laws, Terms of Service, and laws and policies regarding privacy protection of U.S. Persons. Before using such data, the Offeror shall provide proof that the data was acquired in accordance with U.S. laws and regulations.

#### **6.B.12 Public Access to Results**

IARPA is committed to making the results of this research available and maximally useful to the public, industry, government, and the scientific community, in accordance with the policy set forth in the White House Office of Science and Technology Policy's memorandum "Increasing Access to the Results of Federally Funded Scientific Research," dated February 22, 2013, consistent with all other applicable law and policy; agency mission; resource constraints; and U.S. national, homeland, and economic security. ([https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp\\_public\\_access\\_memo\\_2013.pdf](https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp_public_access_memo_2013.pdf))

Upon acceptance of publication, the author's final peer-reviewed manuscript(s) or conference paper(s) must be submitted to the IARPA-designated repository for public access, in accordance with the instructions on IARPA's website at [www.iarpa.gov](http://www.iarpa.gov). The Government will make the Publication available to the public through the repository at no charge, following a one-year embargo to preserve the rights of the publisher. The author must inform the publisher of rights that will be retained by the author and IARPA by including in the publishing/transfer of copyright agreement a provision substantially as follows:

"Journal acknowledges that Author retains the right to provide a copy of the final peer-reviewed manuscript ("Work") to the Federal agency funding the research on which the Work is based upon acceptance for Journal publication, for public archiving as soon as possible but no later than 12 months after publication by Journal. Journal further acknowledges that the Federal Government, having funded the research upon which the Work is based, has certain irrevocable and non-exclusive contractual rights in the Work, which are not affected or altered in any way by this Agreement."

Additionally, awardee must deposit the data underlying the results and findings in the publication in a suitable public repository, in accordance with the project's Data Management Plan. If the metadata describing the underlying or supporting research data is not included in the Publication, the awardee must provide the metadata to the IARPA-designated public access repository, in accordance with the instructions on IARPA's website at [www.iarpa.gov](http://www.iarpa.gov).

IARPA will accept a final published article in lieu of a final peer-reviewed manuscript, provided the author

has the right to provide the article and authorize IARPA to release the article publicly. Data produced under the program, reports to IARPA, and program-related publications should be consistent with the Transparency and Openness Promotion Guidelines of the Center for Open Science, including preregistration of studies and analysis plans. (<https://cos.io/our-services/top-guidelines/>). To the extent possible, all reports to IARPA and all program-related publications should be consistent with statistical best practices described in (Psychological Science (2014) <http://pss.sagepub.com/content/25/1/3>). For example, wherever appropriate, effect sizes and confidence intervals (or the Bayesian equivalents) should be reported, and the data and methodology must be presented so that it is easily used for meta-analysis and independent re-analysis of the data. All Offerors must describe plans to ensure that the above requirements are satisfied.

### **6.B.13 Other Contract Requirements**

#### **6.B.13.a Provisions**

The outline that follows is illustrative of the types of general provisions required by the Federal Acquisition Regulation for Fixed Price and/or Cost Reimbursable Research & Development type contracts and IARPA. This is not a complete list of provisions, nor does it contain specific wording. Copies of complete provisions will be made available prior to award. The Government reserves the right to update this list at time of contract award.

#### **FAR General Provisions applicable to the solicitation:**

FAR 52.204-7 System for Award Management (OCT 2018)

FAR 52.204-16 Commercial and Government Entity Code Reporting (Aug 2020)

FAR 52.204-24 Representation Regarding Certain Telecommunications and Video Surveillance Services or Equipment (NOV 2021)

The Offeror shall not complete the representation at paragraph (d)(1) of this provision if the Offeror has represented that it "does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument" in paragraph (c)(1) in the provision at [52.204-26](#), Covered Telecommunications Equipment or Services—Representation, or in paragraph (v)(2)(i) of the provision at [52.212-3](#), Offeror Representations and Certifications-Commercial Products or Commercial Services. The Offeror shall not complete the representation in paragraph (d)(2) of this provision if the Offeror has represented that it "does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services" in paragraph (c)(2) of the provision at [52.204-26](#), or in paragraph (v)(2)(ii) of the provision at [52.212-3](#).

(a) *Definitions.* As used in this provision—

*Backhaul, covered telecommunications equipment or services, critical technology, interconnection arrangements, reasonable inquiry, roaming, and substantial or essential component* have the meanings provided in the clause [52.204-25](#), Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) *Prohibition.*

(1) Section 889(a)(1)(A) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2019, from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. Nothing in the prohibition shall be construed to—

(i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(2) Section 889(a)(1)(B) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2020, from entering into a contract or extending or renewing a contract with an entity that uses any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. This prohibition applies to the use of covered telecommunications equipment or services, regardless of whether that use is in performance of work under a Federal contract. Nothing in the prohibition shall be construed to—

(i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(c) *Procedures.* The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (<https://www.sam.gov>) for entities excluded from receiving federal awards for "covered telecommunications equipment or services".

(d) *Representation.* The Offeror represents that—

(1) It  will,  will not provide covered telecommunications equipment or services to the Government in the performance of any contract, subcontract or other contractual instrument resulting from this solicitation. The Offeror shall provide the additional disclosure information required at paragraph (e)(1) of this section if the Offeror responds "will" in paragraph (d)(1) of this section; and

(2) After conducting a reasonable inquiry, for purposes of this representation, the Offeror represents that—

It  does,  does not use covered telecommunications equipment or services, or use any equipment, system, or service that uses covered telecommunications equipment or services. The Offeror shall provide the additional disclosure information required at paragraph (e)(2) of this section if the Offeror responds "does" in paragraph (d)(2) of this section.

(e) *Disclosures.*

(1) Disclosure for the representation in paragraph (d)(1) of this provision. If the Offeror has responded "will" in the representation in paragraph (d)(1) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment—

(A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the original equipment manufacturer (OEM) or a distributor, if known);

(B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and

(C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(ii) For covered services—

(A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B) If not associated with maintenance, the Product Service Code (PSC) of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(2) Disclosure for the representation in paragraph (d)(2) of this provision. If the Offeror has responded "does" in the representation in paragraph (d)(2) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment—

(A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the OEM or a distributor, if known);

(B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and

(C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

(ii) For covered services—

(A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B) If not associated with maintenance, the PSC of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

#### FAR 52.204-26 Covered Telecommunications Equipment or Services Representations (Oct 2020)

(a) Definitions. As used in this provision, "covered telecommunications equipment or services" and "reasonable inquiry" have the meaning provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) Procedures. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (<https://www.sam.gov>) for entities excluded from receiving federal awards for "covered telecommunications equipment or services".

(c) (1) Representation. The Offeror represents that it  does,  does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument.

(2) After conducting a reasonable inquiry for purposes of this representation, the offeror represents that it  does,  does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services.

(End of provision)

#### FAR 52.215-16 Facilities Capital Cost of Money (Jun 2003)

#### FAR 52.215-20 Requirements for Certified Cost or Pricing Data and Data Other Than Certified Cost or Pricing Data (Nov 2021)

#### FAR 52.215-22 Limitations on Pass-Through Charges-Identification of Subcontract Effort (Oct 2009)

#### FAR 52.216-1 Type of Contract (Apr 1984)

#### FAR 52.216-27 Single or Multiple Awards (Oct 1995)

#### FAR 52.217-4 Evaluation of Options Exercised at Time of Contract (Jun 1988)

#### FAR 52.217-5 Evaluation of Options (Jul 1990)

#### FAR 52.222-24 Pre-award On-Site Equal Opportunity Compliance Evaluation (Feb 1999)

#### FAR 52.225-25 Prohibition on Contracting With Entities Engaging in Certain Activities or Transactions Relating to Iran Representation and Certifications (JUN 2020)

#### FAR 52.227-15 Representation of Limited Rights Data and Restricted Computer Software (Dec

2007)

FAR 52.230-2 Cost Accounting Standards (Jun 2020)

FAR 52.230-3 Disclosure and Consistency of Cost Accounting Practices (Jun 2020)

FAR 52.230-7 Proposed Disclosure- Cost Accounting Practice Change (Apr 2005)

FAR 52.233-2 Service of Protest Service of Protest (Sept 2006)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the Government Accountability Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from:

Department of the Interior  
Interior Business Center/Acquisition Services  
Directorate 381 Elden Street  
Herndon, VA 20170  
ATTN: Mr. Frank Kennedy and Mr. Brian Kehoe.

An e-mail shall be sent to:

[IARPA\\_DOI\\_SOLSTICE@IBC.DOI.Gov](mailto:IARPA_DOI_SOLSTICE@IBC.DOI.Gov), [Frank\\_Kennedy@ibc.doi.gov](mailto:Frank_Kennedy@ibc.doi.gov), and  
[Brian\\_Kehoe@ibc.doi.gov](mailto:Brian_Kehoe@ibc.doi.gov)

(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

IA52.233-701 Independent Review of Agency Protests

An independent review of protests to the agency, as defined in FAR 33.103(d) (4), is available as an alternative to consideration by the contracting officer. Requests for an independent review shall be submitted directly to the Head of Contracting Activity, along with the protest.

#### **6.B.13.b Clauses**

The outline that follows is illustrative of the types of general clauses required by the Federal Acquisition Regulation for Fixed Price and/or Cost Reimbursable Research & Development type contracts. This is not a complete list of clauses to be included, nor does it contain specific wording. A full list of applicable FAR clauses, to include full text IARPA Clauses, will be made available for review after selection and prior to contract award. The Government reserves the right to update this list at time of contract award.

#### **Examples of Anticipated FAR General Clauses:**

FAR 52.202-1 Definitions (Jun 2020)

FAR 52.203-5 Covenant Against Contingent Fees (MAY 2014)

FAR 52.203-7 Anti-Kickback Procedures (JUN 2020)

FAR 52.203-17 Contractor Employee Whistleblower Rights (Nov 2023)

FAR 52.204-19	Incorporation by Reference of Representations and Certifications (DEC 2014)
FAR 52.204-21	Basic Safeguarding of Covered Contractor Information Systems (Nov 2021)
FAR 52.204-23	Prohibition on Contracting for Hardware, Software, Services Developed or Provided by Kaspersky Lab and Other Covered Entities (DEC 2023)
FAR 52.204-25	Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment (NOV 2021)
FAR 52.204-27	Prohibition on a ByteDance Covered Application (Jun 2023)
FAR 52.204-29	Federal Acquisition Supply Chain Security Act Orders – Representations and Disclosures (DEC 2023)
FAR 52.204-30	Federal <i>Acquisition</i> Supply Chain Security Act Orders—Prohibition (Dec 2023)

(a) *Definitions.* As used in this clause—

*Covered article*, as defined in [41 U.S.C. 4713\(k\)](#), means—

- (1) *Information technology*, as defined in [40 U.S.C. 11101](#), including cloud computing services of all types;
- (2) Telecommunications equipment or telecommunications service, as those terms are defined in section 3 of the Communications Act of 1934 ([47 U.S.C. 153](#));
- (3) The processing of information on a Federal or non-Federal information system, subject to the requirements of the Controlled Unclassified Information program (see [32 CFR part 2002](#)); or
- (4) Hardware, systems, devices, software, or services that include embedded or incidental *information technology*.

*FASCSA order* means any of the following orders issued under the Federal *Acquisition* Supply Chain Security Act (FASCSA) requiring the removal of covered articles from *executive agency* information systems or the exclusion of one or more named *sources* or named covered articles from *executive agency procurement* actions, as described in [41 CFR 201–1.303\(d\)](#) and [\(e\)](#):

- (1) The Secretary of Homeland Security *may* issue FASCSA orders applicable to civilian agencies, to the extent not covered by paragraph (2) or (3) of this definition. This type of *FASCSA order* may be referred to as a Department of Homeland Security (DHS) *FASCSA order*.
- (2) The Secretary of Defense *may* issue FASCSA orders applicable to the Department of Defense (DoD) and national security systems other than *sensitive compartmented information systems*. This type of *FASCSA order* may be referred to as a DoD *FASCSA order*.
- (3) The Director of National Intelligence (DNI) *may* issue FASCSA orders applicable to the intelligence community and *sensitive compartmented information systems*, to the extent not covered by paragraph (2) of this definition. This type of *FASCSA order* may be referred to as a DNI *FASCSA order*.

*Intelligence community*, as defined by [50 U.S.C. 3003\(4\)](#), means the following—

- (1) The Office of the Director of National Intelligence;
- (2) The Central Intelligence Agency;
- (3) The National Security Agency;
- (4) The Defense Intelligence Agency;
- (5) The National Geospatial-Intelligence Agency;
- (6) The National Reconnaissance Office;
- (7) Other offices within the Department of Defense for the collection of specialized national intelligence through reconnaissance programs;
- (8) The intelligence elements of the Army, the Navy, the Air Force, the Marine Corps, the Coast Guard, the Federal Bureau of Investigation, the Drug Enforcement Administration, and the Department of Energy;
- (9) The Bureau of Intelligence and Research of the Department of State;
- (10) The Office of Intelligence and Analysis of the Department of the Treasury;
- (11) The Office of Intelligence and Analysis of the Department of Homeland Security; or
- (12) Such other elements of any department or agency as *may* be designated by the President, or designated jointly by the Director of National Intelligence and the head of the department or agency concerned, as an element of the intelligence community.

*National security system*, as defined in [44 U.S.C. 3552](#), means any information system (including any telecommunications system) used or operated by an agency or by a contractor of an agency, or other organization on behalf of an agency—

- (1) The function, operation, or use of which involves intelligence activities; involves cryptologic activities related to national security; involves command and control of military forces; involves equipment that is an integral part of a weapon or weapons system; or is critical to the direct fulfillment of military or intelligence missions, but does not include a system that is to be used for routine administrative and business applications (including payroll, finance, logistics, and personnel management applications); or
- (2) Is protected at all times by procedures established for information that have been specifically authorized under criteria established by an Executive order or an Act of Congress to be kept classified in the interest of *national defense* or foreign policy.

*Reasonable inquiry* means an inquiry designed to uncover any information in the entity's possession about the identity of any covered articles, or any *products* or services produced or provided by a *source*. This applies when the covered article or the *source* is subject to an applicable *FASCSA order*. A *reasonable inquiry* excludes the need to include an internal or third-party audit.



*Sensitive compartmented information* means *classified information* concerning or derived from intelligence *sources*, methods, or analytical processes, which is required to be handled within formal access control systems established by the Director of National Intelligence.

*Sensitive compartmented information system* means a national security system authorized to process or store *sensitive compartmented information*.

*Source* means a non-Federal supplier, or potential supplier, of *products* or services, at any tier.

(b) *Prohibition*.

(1) Unless an applicable waiver has been issued by the issuing official, Contractors *shall* not provide or use as part of the performance of the contract any covered article, or any *products* or services produced or provided by a *source*, if the covered article or the *source* is prohibited by an applicable FASCSA orders as follows:

(i) For *solicitations* and contracts awarded by a Department of Defense *contracting office*, DoD FASCSA orders apply.

(ii) For all other *solicitations* and contracts DHS FASCSA orders apply.

(2) The Contractor *shall* search for the phrase “*FASCSA order*” in the *System for Award Management (SAM)* at <https://www.sam.gov> to locate applicable FASCSA orders identified in paragraph (b)(1).

(3) The Government *may* identify in the *solicitation* additional FASCSA orders that are not in SAM, which are effective and apply to the *solicitation* and resultant contract.

(4) A *FASCSA order* issued after the date of *solicitation* applies to this contract only if added by an amendment to the *solicitation* or modification to the contract (see FAR [4.2304](#)(c)). However, see paragraph (c) of this clause.

(5)

(i) If the contractor wishes to ask for a waiver of the requirements of a new *FASCSA order* being applied through modification, then the Contractor *shall* disclose the following:

(A) Name of the product or service provided to the Government;

(B) Name of the covered article or *source* subject to a *FASCSA order*;

(C) If applicable, name of the vendor, including the Commercial and Government Entity code and *unique entity identifier* (if known), that supplied or *supplies* the covered article or the product or service to the *Offeror*;

(D) Brand;

(E) Model number (original equipment manufacturer number, manufacturer part number, or wholesaler number);

(F) Item description;

(G) Reason why the applicable covered article or the product or service is being provided or used;

(ii) *Executive agency review of disclosures.* The *contracting officer* will review disclosures provided in paragraph (b)(5)(i) to determine if any waiver is warranted. A *contracting officer* may choose not to pursue a waiver for covered articles or *sources* otherwise covered by a *FASCSA order* and to instead pursue other appropriate action.

(c) *Notice and reporting requirement.*

(1) During contract performance, the Contractor *shall* review *SAM.gov* at least once every three months, or as advised by the *Contracting Officer*, to check for covered articles subject to *FASCSA order(s)*, or for *products* or services produced by a *source* subject to *FASCSA order(s)* not currently identified under paragraph (b) of this clause.

(2) If the Contractor identifies a new *FASCSA order(s)* that could impact their supply chain, then the Contractor *shall* conduct a *reasonable inquiry* to identify whether a covered article or product or service produced or provided by a *source* subject to the *FASCSA order(s)* was provided to the Government or used during contract performance.

(3)

(i) The Contractor *shall* submit a report to the *contracting office* as identified in paragraph (c)(3)(ii) of this clause, if the Contractor identifies, including through any notification by a subcontractor at any tier, that a covered article or product or service produced or provided by a *source* was provided to the Government or used during contract performance and is subject to a *FASCSA order(s)* identified in paragraph (b) of this clause, or a new *FASCSA order* identified in paragraph (c)(2) of this clause. For indefinite delivery contracts, the Contractor *shall* report to both the *contracting office* for the indefinite delivery contract and the *contracting office* for any affected order.

(ii) If a report is required to be submitted to a *contracting office* under (c)(3)(i) of this clause, the Contractor *shall* submit the report as follows:

(A) If a Department of Defense *contracting office*, the Contractor *shall* report to the website at <https://dibnet.dod.mil>.

(B) For all other *contracting offices*, the Contractor *shall* report to the *Contracting Officer*.

(4) The Contractor *shall* report the following information for each covered article or each product or service produced or provided by a *source*, where the covered article or *source* is subject to a *FASCSA order*, pursuant to paragraph (c)(3)(i) of this clause:

(i) Within 3 business days from the date of such identification or notification:

(A) Contract number;

(B) Order number(s), if applicable;

(C) Name of the product or service provided to the Government or used during performance of the contract;

(D) Name of the covered article or *source* subject to a *FASCSA order*;

(E) If applicable, name of the vendor, including the Commercial and Government Entity code and *unique entity identifier* (if known), that supplied the covered article or the product or service to the Contractor;

(F) Brand;

(G) Model number (original equipment manufacturer number, manufacturer part number, or wholesaler number);

(H) Item description; and

(I) Any readily available information about mitigation actions undertaken or recommended.

(ii) Within 10 business days of submitting the information in paragraph (c)(4)(i) of this clause:

(A) Any further available information about mitigation actions undertaken or recommended.

(B) In addition, the Contractor *shall* describe the efforts it undertook to prevent submission or use of the covered article or the product or service produced or provided by a *source* subject to an applicable *FASCSA order*, and any additional efforts that will be incorporated to prevent future submission or use of the covered article or the product or service produced or provided by a *source* that is subject to an applicable *FASCSA order*.

(d) *Removal*. For Federal Supply Schedules, Governmentwide *acquisition* contracts, multi-agency contracts or any other *procurement* instrument intended for use by multiple agencies, upon notification from the *Contracting Officer*, during the performance of the contract, the Contractor *shall* promptly make any necessary changes or modifications to remove any product or service produced or provided by a *source* that is subject to an applicable *FASCSA order*.

(e) *Subcontracts*.

(1) The Contractor *shall* insert the substance of this clause, including this paragraph (e) and excluding paragraph (c)(1) of this clause, in all subcontracts and other contractual instruments, including subcontracts for the *acquisition* of *commercial products* and *commercial services*.

(2) The Government *may* identify in the *solicitation* additional FASCSA orders that are not in SAM, which are effective and apply to the contract and any subcontracts and other contractual instruments under the contract. The Contractor or higher-tier subcontractor *shall* notify their subcontractors, and suppliers under other contractual instruments, that the FASCSA orders in the *solicitation* that are not in SAM apply to the contract and all subcontracts.

(End of clause)

FAR 52.216-7 Allowable Cost and Payment (Aug 2018)

FAR 52.216-8 Fixed Fee (Jun 2011)

FAR 52.216-11 Cost Contract-No Fee (Apr 1984)

FAR 52.217-9 Option to Extend the Terms of the Contract (Mar 2000)

(a) The Government may extend the term of this contract by written notice to the Contractor within **TBD**

the period of time within which the Contracting Officer may exercise the option]; provided that the Government gives the Contractor a preliminary written notice of its intent to extend at least **TDB** days [60days unless a different number of days is inserted] before the contract expires. The preliminary notice does not commit the Government to an extension.

(b) If the Government exercises this option, the extended contract shall be considered to include this option clause.

(c) The total duration of this contract, including the exercise of any options under this clause, shall not exceed **TDB** (months) (years).

(End of clause)

FAR 52.222-35	Equal Opportunity for Veterans (JUN 2020)
FAR 52.222-36	Equal Opportunity for Workers With Disabilities (JUN 2020)
FAR 52.222-50	Combating Trafficking in Persons (NOV 2021)
FAR 52.226-8	Encouraging Contractor Policies to Ban Text Messaging While Driving (MAY 2024)
FAR 52.225-13	Restrictions on Certain Foreign Purchases (FEB 2021)
FAR 52.227-14	Rights in Data – General (May 2014)
FAR 52.232-39	Unenforceability of Unauthorized Obligations (JUN 2013)
FAR 52.232-40	Providing Accelerated Payments to Small Business Subcontractors (MAR 2023)
FAR 52.233-4	Applicable Law for Breach of Contract Claim (OCT 2004)
FAR 52.242-15	Stop-Work Order (AUG 1989) Alt I (APR 1984)
FAR 52.243-1	Changes – Firm Fixed Price Alt V (Apr 1984)
FAR 52.243-2	Changes – Cost Reimbursement Alt V (Apr 1984)
FAR 52.244-2	Subcontracts Jun 2020
FAR 52.244-6	Subcontracts for Commercial Products and Commercial Services (FEB 2024)
FAR 52.246-7	Inspection of Research and Development-Fixed-Price (AUG 1996)
FAR 52.246-8	Inspection of Research and Development—Cost-Reimbursement (MAY 2001)
FAR 52.249-6	Termination (Cost-Reimbursement) (May 2004)
FAR 52.247-34	F.o.b. Destination (November 1991)
FAR 52.249-6	Termination (Cost-Reimbursement) (May 2004)
FAR 52.252-2	Clauses Incorporated by Reference (Feb1998)
DIAR 1452.201-70	Authorities and delegations (Sep 2011)
DIAR 1452.203-70 (Jul 1996)	Restrictions on Endorsements (Jul 1996) DIAR 1452.204-70 Release of Claims
DIAR 1452.215-70	Examination of Records by the Department of Interior (Apr 1984)

DIAR 1452.215-71 Use and Disclosure of Proposal Information - Department of Interior (Apr 1984)

DIAR 1452.224-1 Privacy Act Notification (Jul 1996)

Electronic Invoicing and Payment Requirements - Invoice Processing Platform (IPP)  
(February 2021)

Payment requests must be submitted electronically through the U. S. Department of the Treasury's Invoice Processing Platform System (IPP).

"Payment request" means any request for contract financing payment or invoice payment by the Contractor. To constitute a proper invoice, the payment request must comply with the requirements identified in the applicable Prompt Payment clause included in the contract, or the clause 52.212-4 Contract Terms and Conditions - Commercial Items included in commercial item contracts. The IPP website address is: <https://www.ipp.gov>.

Under this contract, the following documents are required to be submitted as an attachment to the IPP invoice [Contracting Officer to edit and include the documentation required under this contract]:

The Contractor must use the IPP website to register access and use IPP for submitting requests for payment. The Contractor Government Business Point of Contact (as listed in SAM) will receive enrollment instructions via email from the Federal Reserve Bank of St. Louis (FRBSTL) within 3 - 5 business days of the contract award date. Contractor assistance with enrollment can be obtained by contacting the IPP Production Helpdesk via email [IPPCustomerSupport@fiscal.treasury.gov](mailto:IPPCustomerSupport@fiscal.treasury.gov) or phone (866) 973-3131.

If the Contractor is unable to comply with the requirement to use IPP for submitting invoices for payment, the Contractor must submit a waiver request in writing to the Contracting Officer with its proposal or quotation.

(End of Local Clause)

**SECTION 7: APPENDICES**

**APPENDIX A - Templates for Volume 1: Technical Proposal**

**Appendix A.1: Cover Sheet for Volume 1: Technical and Management Proposal**

(1) BAA Number	<b>DOI-BAA-SOLSTICE-FY25-01</b>
(2) Topic/Area of Interest – (Reference BAA Section 1.1)	
(3) Lead Organization Submitting Proposal	
(4) Type of Business, Selected Among the Following Categories: “Large Business”, “Small Disadvantaged Business”, “Other Small Business”, “HBCU”, “MI”, “Other Educational”, or “Other Nonprofit”	
(5) Offeror’s Reference Number (if any)	
(6) Other Team Members (if applicable) and Type of Business for Each	
(7) Proposal Title	
(8) Technical Point of Contact to Include: Title, First Name, Last Name, Street Address, City, State, Zip Code, Telephone, Fax (if available), Electronic Mail (if available)	
(9) Administrative Point of Contact to Include: Title, First Name, Last Name, Street Address, City, State, Zip Code, Telephone, Fax (if available), Electronic Mail (if available)	
(10) Volume 1 no more than the specified page limit	Yes/No
(11) Restrictions on Intellectual property rights details provided in Appendix A format?	Yes/No
(12) Research Data Management Plan included?	Yes/No
(13) OCI Notification	Yes/No
(13a) If No, is written OCI certification included (see Appendix A)?	Yes/No
(14) Are one or more U.S. Academic Institutions part of your team?	Yes/No
(14a) If Yes, are you including an Academic Institution Acknowledgment Statement with your proposal for each U.S. Academic Institution that is part of your team (see Appendix A)?	Yes/No
(15) Total Funds Requested from IARPA and the Amount of Cost Share (if any)	\$
(16) Date of Proposal Submission	

## Appendix A.2: Academic Institution Acknowledgment Letter

-- Please Place on Official Letterhead --

<Insert date>

To: Contracting Officer  
ODNI/IARPA  
Office of the Director of National Intelligence  
Washington, D.C. 20511

Subject: Academic Institution Acknowledgment Letter Reference: Executive Order 12333, As Amended, Para 2.7

This letter is to acknowledge that the undersigned is the responsible official of <insert name of the academic institution>, authorized to approve the contractual relationship in support of the Office of the Director of National Intelligence's Intelligence Advanced Research Projects Activity and this academic institution.

The undersigned further acknowledges that he/she is aware of the Intelligence Advanced Research Projects Activity's proposed contractual relationship with <insert name of institution> through DOI-BAA-SOLSTICE-FY25-01 and is hereby approved by the undersigned official, serving as the president, vice-president, chancellor, vice-chancellor, or provost of the institution.

<Name>  
<Position>

Date

**Appendix A.3: Intellectual Property and Data Rights**

[Please provide here your good faith representation of ownership or possession of appropriate licensing rights to all IP that shall be utilized under the Program.]

**Patents**

<b>PATENTS</b>				
<b>Patent number (or application number)</b>	<b>Patent name</b>	<b>Inventor name(s)</b>	<b>Patent owner(s) or assignee</b>	<b>Incorporation into deliverable</b>
(LIST)	(LIST)	(LIST)	(LIST)	(Yes/No; applicable deliverable)

- (1) Intended use of the patented invention(s) listed above in the conduct of the proposed research.
- (2) Description of license rights to make, use, offer to sell, or sell, if applicable, that are being offered to the Government in patented inventions listed above.
- (3) How the offered rights will permit the Government to reach its program goals (including transition) with the rights offered.
- (4) Cost to the Government to acquire additional or alternative rights, if applicable.
- (5) Alternatives, if any, that would permit IARPA to achieve program goals.

**Data (Including Technical Data and Computer Software)**

<b>NONCOMMERCIAL ITEMS</b>			
<b>Technical Data, Computer Software To be Furnished With Restrictions</b>	<b>Basis for Assertion</b>	<b>Asserted Rights Category</b>	<b>Name of Person Asserting Restrictions</b>
(LIST)	(LIST)	(LIST)	(LIST)

<b>COMMERCIAL ITEMS</b>			
<b>Technical Data, Computer Software To be Furnished With Restrictions</b>	<b>Basis for Assertion</b>	<b>Asserted Rights Category</b>	<b>Name of Person Asserting Restrictions</b>
(LIST)	(LIST)	(LIST)	(LIST)

- (1) Intended use of the data, including, technical data and computer software, listed above in the conduct of the proposed research.



- (2) Description of Asserted Rights Categories, specifying restrictions on Government's ability to use, modify, reproduce, release, perform, display, or disclose technical data, computer software, and deliverables incorporating technical data and computer software listed above.
- (3) How the offered rights will permit the Government to reach its program goals (including transition) with the rights offered.
- (4) Cost to the Government to acquire additional or alternative rights, if applicable.
- (5) Alternatives, if any, that would permit IARPA to achieve program goals.

## Appendix A.4: Organizational Conflicts of Interest Certification Letter

(Month DD, YYYY)

Office of the Director of National Intelligence  
Intelligence Advanced Research Projects Activity (IARPA)  
Superior Options for Long-life Solar Technologies with Impressive Conversion Efficiencies (SOLSTICE) BAA

ATTN: Contracting Officer  
ODNI/IARPA  
Washington, DC 20511

Subject: OCI Certification

Reference: <Insert Program Name>, DOI-BAA-SOLSTICE-FY25-01, (Insert assigned proposal ID#, if received)

Dear \_\_\_\_\_,

In accordance with IARPA Broad Agency Announcement DOI-BAA-SOLSTICE-FY25-01, Organizational Conflicts of Interest (OCI), and on behalf of (Offeror name) I certify that neither (Offeror name) nor any of our subcontractor teammates has as a potential conflict of interest, real or perceived, as it pertains to the Video LINCS BAA. Please note the following subcontractors and their proposed roles:

[Please list all proposed contractors by name with a brief description of their proposed involvement.]

If you have any questions, or need any additional information, please contact (Insert name of contact) at (Insert phone number) or (Insert e-mail address).

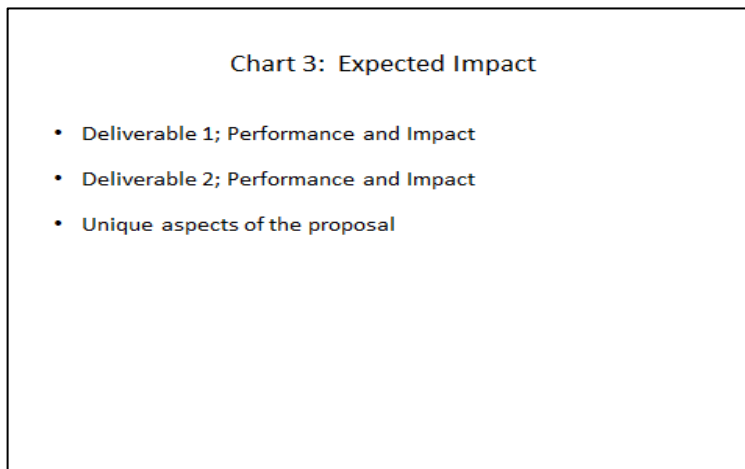
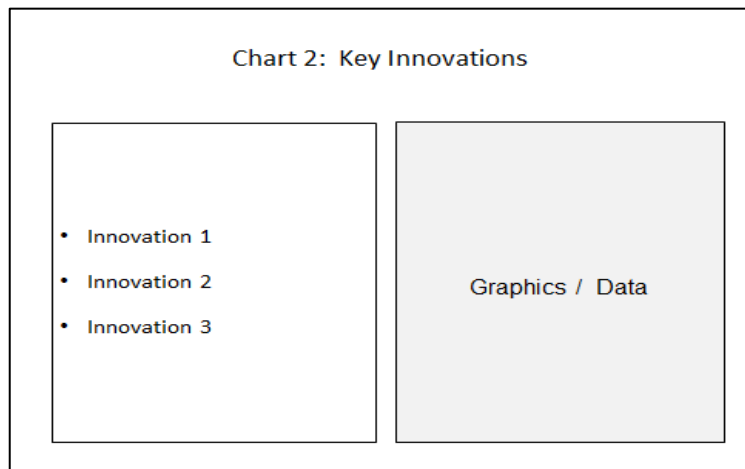
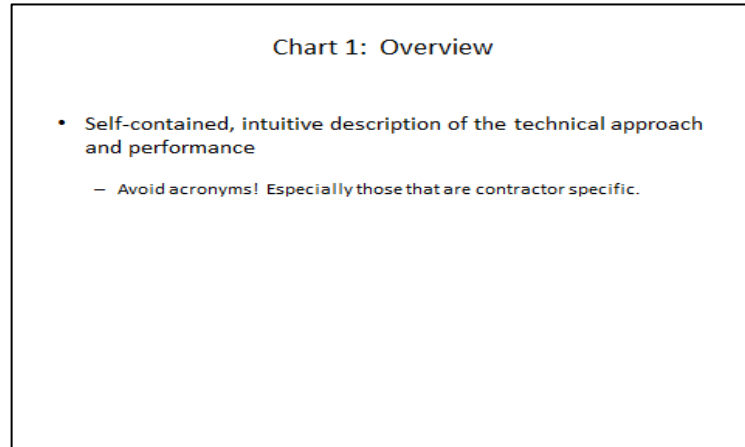
Sincerely,

(Insert organization name) (Shall be signed by an official that has the authority to bind the organization)

(Insert signature)

(Insert name of signatory) (Insert title of signatory)

## Appendix A.5: Three Chart Summary of the Proposal



## Appendix A.6: Research Data Management Plan (RDMP) DOI-BAA-SOLSTICE-FY25-01

The Offeror must address each of the elements noted below.

The RDMP shall comply with the requirements stated in Section 4 of the BAA. In doing so, it will support the objectives of the ODNI Public Access Plan at <https://www.iarpa.gov/index.php/working-with-iarpa/public-access-to-iarpa-research>

1. **Sponsoring IARPA Program** (required):
2. **Offeror** (i.e., lead organization responding to BAA) (required):
3. **Offeror point of contact** (required):  
*The point of contact is the proposed principal investigator (PI) or his/her Designee.*
  - a. **Name and Position:**
  - b. **Organization:**
  - c. **Email:**
  - d. **Phone:**
4. **Research data types** (required):  
*Provide a brief, high-level description of the types of data to be collected or produced in the course of the project.*
5. **Standards for research data and metadata content and format** (required):  
*Use standards reflecting the best practices of the relevant scientific discipline and research community whenever possible.*
6. **Plans for making the research data that underlie the results in peer-reviewed journal articles and conference papers digitally accessible to the public** at the time of publication/conference or within a reasonable time thereafter (required):  
*The requirement could be met by including the data as supplementary information to a peer reviewed journal article or conference paper or by depositing the data in suitable repositories available to the public.*
  - a. **Anticipated method(s) of making research data publicly accessible:**  
\_\_\_ Provide dataset(s) to publisher as supplementary information (if publishers allow public access)  
\_\_\_ Deposit dataset(s) in Data Repository  
\_\_\_ Other (specify) \_\_\_\_\_
  - b. **Proposed research data repository or repositories** (for dataset(s) not provided as supplementary information):  
*Suitable repositories could be discipline-specific repositories, general purpose research data repositories, or institutional repositories, as long as they are publicly accessible.*
  - c. **Retention period, at least three years after publication of associated research results:**  
*State the minimum length of time the data will remain publicly accessible.*
  - d. **Submittal of metadata to IARPA:**  
*Offerors are required to make datasets underlying the results published in peer-reviewed journal or conferences digitally accessible to the public to the extent feasible. Here, the Proposer should state a commitment to submit metadata on such datasets to IARPA in a timely manner. Note: This does not supersede any requirements for deliverable data, as the award document may include metadata as a deliverable item.*
7. **Policies and provisions for sharing and preservation** (as applicable):
  - a. Policies and provisions for appropriate protection of privacy, confidentiality, security, and intellectual property:
  - b. Descriptions of tools, including software, which may be needed to access and interpret the data:

- c. Policies and provisions for re-use, re-distribution, and production of derivative works:
8. **Justification for not sharing and/or preserving data underlying the results of peer-reviewed publications** (as applicable):
- If, for legitimate reasons, the data cannot be shared and preserved, the plan must include a justification detailing such reasons. Potential reasons may include privacy, confidentiality, security, IP rights considerations; size of data sets; cost of sharing and preservation; time required to prepare the dataset(s) for sharing and preservation.*

**Appendix A.7: Statement of Work (SOW) Template (RESERVED)**

## **Appendix A.8: Power System Efficiency Loss Register Workbook**

See SAM.gov SOLSTICE BAA posting to download template. Instructions for completion contained on the “Guidance & Objectives” tab. Offerors shall upload completed Power System Efficiency Loss Register Workbook as an Attachment to their Proposal submission.

**APPENDIX B - Templates for Volume 2: Cost Proposal**

**Appendix B.1: Cover Sheet for Volume 2: Cost Proposal**

(1) BAA Number	<b>DOI-BAA-SOLSTICE-FY25-01</b>
(2) Topic/Area of Interest: (See BAA Section 1.3)	
(3) Lead organization submitting proposal	
(4) Type of Business, Selected Among the Following Categories: “Large Business”, “Small Disadvantaged Business”, “Other Small Business”, “HBCU”, “MI”, “Other Educational”, or “Other Nonprofit”	
(5) Offeror’s Reference Number (if any)	
(6) Other Team Members (if applicable) and Type of Business for Each	
(7) Proposal Title	
(8) Technical Point of Contact to Include: Title, First Name, Last Name, Street Address, City, State, Zip Code, Telephone, Fax (if available), Electronic Mail (if available)	
(9) Administrative Point of Contact to Include: Title, First Name, Last Name, Street Address, City, State, Zip Code, Telephone, Fax (if available), Electronic Mail (if available)	
(10) Contract type/award Instrument Requested: specify	
(11) Place(s) and Period(s) of Performance	
(12) Total Proposed Cost Separated by Basic Award and Option(s) (if any)	
(13) Name, Address, Telephone Number of the Offeror’s Defense Contract Management Agency (DCMA) Administration Office or Equivalent Cognizant Contract Administration Entity, if Known	
(14) Name, Address, Telephone Number of the Offeror’s Defense Contract Audit Agency (DCAA) Audit Office or Equivalent Cognizant Contract Audit Entity, if Known	
(15) Date Proposal was Prepared	
(16) DUNS Number	
(17) TIN Number	
(18) CAGE Code	
(19) Proposal Validity Period	
(20) Cost Summaries Provided	
(21) Size of Business in accordance with NAICS Code 541715	



**Appendix B.2: Contractor/Subcontractor Cost Element Sheet for Volume 2 Cost Proposal**

Prime Contractor/Subcontractor Cost Element Sheet for Volume 2 Cost Proposal					
Complete a Summary Cost Element Sheet and separate sheets for the Base Period and each Option Period					
COST ELEMENT		BASE	RATE	AMT	
DIRECT LABOR (List each labor category separately. Identify Key Personnel by name.)		# of Hours	\$	\$	
TOTAL DIRECT LABOR				\$	
FRINGE BENEFITS		\$	%	\$	
TOTAL LABOR OVERHEAD		\$	%	\$	
SUBCONTRACTORS, IOTS, CONSULTANTS (List separately. See below table.)				\$	
MATERIALS & EQUIPMENT (List each material and equipment item separately.)		Quantity	\$ unit price	\$	
SOFTWARE & IP (List separately. See table below.)		\$	\$	\$	
TOTAL MATERIALS & EQUIPMENT				\$	
MATERIAL OVERHEAD		\$	%	\$	
TRAVEL (List each trip separately.)		# of travelers	\$ price per traveler	\$	
TOTAL TRAVEL				\$	
OTHER DIRECT COSTS (List each item separately.)		Quantity	\$ unit price	\$	
TOTAL ODCs				\$	
G&A		\$	%	\$	
SUBTOTAL COSTS				\$	
COST OF MONEY		\$	%	\$	
TOTAL COST				\$	
PROFIT/FEE		\$	%	\$	
TOTAL PRICE/COST				\$	
GOVERNMENT SHARE, IF APPLICABLE				\$	
RECIPIENT SHARE, IF APPLICABLE				\$	
SUBCONTRACTORS/IOTS) & CONSULTANTS PRICE SUMMARY					
A	B	C	D	E	F
SUB-CONTRACTOR IOT & CONSULTANT NAME	SOW TASKS PERFORMED *	TYPE OF AWARD	SUB-CONTRACTOR, IOT & CONSULTANT QUOTED PRICE	COST PROPOSED BY PRIME FOR SUBCONTRACTOR, IOT & CONSULTANT	DIFFERENCE (Column D - Column E) IF APPLICABLE
TOTALS					
*Identify Statement of Work, Milestone or Work Breakdown Structure paragraph, or provide a narrative explanation as an addendum to this Table that describes the effort to be performed.					

**Appendix B.3: Software and IP Costs**

<b>Software and IP Costs</b>		
<b>Item</b>	<b>Cost</b>	<b>Date of Expiration</b>
(List)		

NOTE: Educational institutions and non-profit organizations as defined in FAR 31.3 and 31.7, respectively, at the prime and subcontractor level may deviate from the cost template in Appendix B when estimating the direct labor portion of the proposal to allow for OMB guided accounting methods (2 CFR 220) that are used by their institutions. The methodology shall be clear and provide sufficient detail to substantiate proposed labor costs. For example, each labor category shall be listed separately; identify Key Personnel and provide hours/rates or salaries and percentage of time allocated to the project.



**Appendix B.5: Contract Deliverables Table**

<b>Contract Deliverables</b>				
<b>SOW TASK#</b>	<b>Deliverable Title</b>	<b>Format</b>	<b>Due Date</b>	<b>Distribution/Copies</b>
Continual	Monthly Contract Status Report	Gov't Format	10th of each month	Copy to PM, CO and COTR
Continual	Monthly Technical Status Reports	Gov't Format	10th of each month	Standard Distribution**
** Standard Distribution: 1 copy of the transmittal letter <u>without the deliverable to the Contracting Officer.</u> 1 copy of the transmittal letter <u>with the deliverable to the Primary PM and COTR.</u>				