			Robust Energy Sources for Intelligence Logistics In Extreme Novel and Challenging Environments (RESILIENCE)								
			BAA 20-02								
			NOTICE: IARPA will accept questions until October 19th								
			Industry Questions and Government Answers -								
Question number	**GENERAL INSTRUCTIONS**		**Industry Questions**		**Paragraph & Page #**		**Government Responses**		**Change to BAA (Yes/No)**		**Paragraph & Page #**
Question number	**Section 1 - TECHNICAL PROGRAM OVERVIEW**								**Change to BAA (Yes/No)**		**Paragraph & Page #**
Question 1	**Round 1**		**The BAA says no internal combustion engine (ICE). I wonder if a solid oxide fuel cell (SOFC) is considered and ICE since a SOFC could consist an internal burner**		**Page 6**		**Fuel cells are in scope, provided that they do not comprise a component that is specifically out of scope per section 1.C.4 of the BAA. A heat source for temperature control of a solid oxide fuel cell does not constitute an internal combustion engine.**				

Question 2	**Round 1**		**Would like some clarification on the meaning of self-contained, which was described in the presentation as: "No external equipment, addition of electricity or fuels, or other external inputs." For the case of a fuel cell, would air count as an external input? That is, if we built a system that contained all of the gas handling equipment necessary to handle taking in outside air and passing it through a fuel cell, such that the fuel cell only has a positive and negative terminal for external connections, would this be satisfactory want to differentiate between solutions that carry oxidant on board from solutions which take in air from the surroundings. This would be for Track 1.**				**Air at ambient temperature and pressure does not count as an external input. As noted, all equipment needed for operation (e.g. compression or gas conditioning equipment) will be considered for energy density and power density measurements.**				

Question 3	**Round 1**		**We developed a technology based on thermionics that has 10X the efficiency of "historically inefficient" thermionic generators making it competitive with batteries, ICE generators and fuel cells. It is similar to fuel cells in that it converts fuel to electricity with a silent solid state architecture (not moving parts other than a fuel pump if using liquid fuel (but fuel pumps can be avoided if using compressed gas like hydrogen, propane, natural gas etc.) but instead of chemically processing the fuel, the fuel is combusted.** **From a technical requirements perspective it seems like this may be of interest to you but the BAA doesn't mention thermionics as a technology**				**The BAA invites proposals to all types of energy storage and power systems, not just batteries or fuel cells. All proposed technologies must meet the metrics listed in Section 1.E and must not comprise out-of-scope characteristics in Section 1.C.4.**				

			Are you only interested in batteries and fuel cells?								
Question 4	**Round 1**		**Is a US University eligible to be a prime recipient? I ask because of the sentence "The Prime contractor must be a U.S. company on the top of page 18 of the BAA**		**Page 18**		**Yes, a US University is eligible to be a prime recipient.**				
Question 5	**Round 1**		**We are developing a structural battery that can increase the energy density by up to 30% at the system level without altering the battery chemistry. Currently, we focus on the further development of the technology for Aerospace including the solar-powered perpetual flying UAV.**				**Structural batteries, or any other power solution, are in scope provided they can meet the metrics listed in Section 1.E.**				

			Are structural batteries within the scope of the BAA?								
Question 6	**Round 1**		**Are maritime/undersea energy sources in scope for the RESILIENCE BAA?**				**Per section 1.C.1, "The objectives of the program, as stated in the metrics, include performance and properties of power solutions that can be used for multiple applications; no particular form factor is specified nor are any particular devices to be powered envisaged."**				
Question 7	**Round 1**		**Technologies to retain cell charge could potentially be integrated into a battery pack with very low SWAP (Size Weight and Power) to achieve the RESILIENCE program objectives specifically in Track 2. One example is the use of thermoelectric generators (TEG's) which have doubled in efficiency in recent years and may have application at the battery pack level but not**				**Proposals to the RESILIENCE BAA may include batteries (primary or secondary cells), fuel cells, supercapacitors, or other solutions that convert some form of energy to electricity.** **Integrated power systems are within the scope of the program, provided the target metrics of the program are achievable**				

			the cell level. All of the RESILIENCE performance objectives generally appear to apply at the cell level, however creative results that meet the objectives may be obtained by integrating technologies at the battery level. Would the application of TEG's, or other battery pack level technologies be allowed in consideration of the RESILIENCE objectives which appear to be exclusively at the cell level? B) If the TEG's were integrated into a single cell that was part of a pack, and only 1 TEG-enabled "charge retention" cell was needed per some number of cells within a pack, would that be seen as compatible with the RESILIENCE objectives?				**with the proposed integrated power system.**				

Question 8	**Round 1**		**A quote from the Phase I section of the BAA says "a successful Phase 1 deliverable could comprise 1) a coin cell, 2) a description of the mass and volume of the cathode, anode and electrolyte contained within, and 3) a mathematical model describing how the new cathode and electrolyte's measured performance would be used in a pouch cell that would meet all of the performance metrics for Phase 1 when packaged." Does this mean that for Phase I we just have to demonstrate a simple coin cell of a battery formulation (anode, cathode and electrolyte) that has the potential, based on our mathematical models, to meet the Phase I requirements when packaged? For example, we don't actually have to meet the Phase I requirement 600 Wh/kg in**				**Any mathematical model deliverable in Phase 1 must credibly describe how the offeror's delivered power solution can meet all the related metrics in Section 1.E when packaged.**				

			the actual coin. This can't be as trivial as a coin that weighs 1 gram with stored energy of 0.6 Wh, which would result in a ratio of 600Wh/kg (the "mathematical model"), including packaging.								
Question 9	**Round 1**		**We noted that solutions involving radioactivity were out of scope: more generically, would the program consider power solutions that make use of temporarily activated nuclei to store and release energy as opposed to classical radioactive decay?**				**No, IARPA will not consider any solutions involving radioactivity.**				
Question 10	**Round 1**		**What does 'scale' for Phase 3 mean? Does "scale to prototype required for Phase 3 of the program" (as stated in the Phase 2 section of BAA) mean you are expecting more than a single cell with positive and negative terminals charged and discharged in a thermal chamber?**		**Page 5**		**Scale for Phase 3 means that power solutions must meet all Phase 3 metrics. Per Section 1.C.2, deliverables for Phase 3 have no specific voltage requirements or optimum size (mass or volume), provided that they meet program metrics.**				

Question 11	**Round 1**		**Metrics included in Tables 1 and 2 provide a maximum unit temperature during operation of 120°Celsius for Solution Tracks 1 and 2. Can you confirm 120°Celsius (not Farenheit) and clarify that this value represents a maximum operating temperature parameter only and is not a target performance objective?**				**The metrics regarding temperature in Tables 1 and 2 are stated in Celsius and are maximum operating values. Notional temperatures for testing are provided in Section 1.D.**				
	Section 2 - AWARD INFORMATION								**Change to BAA (Yes/No)**		**Paragraph & Page #**
	Section 3 - ELIGIBILITY INFORMATION								**Change to BAA (Yes/No)**		**Paragraph & Page #**

	Section 4 - PROPOSAL INFORMATON								**Change to BAA (Yes/No)**		**Paragraph & Page #**
	Section 5 - PROPOSAL REVIEW INFORMATION								**Change to BAA (Yes/No)**		**Paragraph & Page #**
	Section 6 - AWARD ADMINISTRATION INFORMATION								**Change to BAA (Yes/No)**		**Paragraph & Page #**