AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. Contract ID Code	Page
Cost-Plus-Fixed-Fee	1 Of 15

2. Amendment/Modification No.	3. Effective Date	4. Requisition/Purchase Req No.	5. Project No. (If applicable)
13	2013FEB06	SEE SCHEDULE	

6. Issued By Code W56HZV

U.S. ARMY CONTRACTING COMMAND
LISA M. KOSKI
WARREN, MICHIGAN 48397-5000
HTTP://CONTRACTING.TACOM.ARMY.MIL

EMAIL: LISA.M.KOSKI@US.ARMY.MIL

7. Administered By (If other than Item 6) Code S2404A

DCMA MANASSAS
10500 BATTLEVIEW PKWY
SUITE 200
MANASSAS VA 20109-2342

8. Name And Address Of Contractor (No., Street, City, County, State and Zip Code)

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
DEFENSE SOLUTIONS SERVICES
1710 SAIC DR
MCLEAN, VA 22102-3703

Code 5UTP8 Facility Code

☐ **9A. Amendment Of Solicitation No.**

9B. Dated (See Item 11)

☒ **10A. Modification Of Contract/Order No.**

W56HZV-09-D-0153/0002

10B. Dated (See Item 13)

2011JUN09

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ **The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offers**

☐ **is extended,** ☐ **is not extended.**

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing items 8 and 15, and returning _____ copies of the amendments: (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. Accounting And Appropriation Data (If required)

ACRN: AC NET INCREASE: $41,382.00

13. THIS ITEM ONLY APPLIES TO MODIFICATIONS OF CONTRACTS/ORDERS
It Modifies The Contract/Order No. As Described In Item 14.

☐	**A. This Change Order is Issued Pursuant To: The Changes Set Forth In Item 14 Are Made In The Contract/Order No. In Item 10A.**
☒	**B. The Above Numbered Contract/Order Is Modified To Reflect The Administrative Changes (such as changes in paying office, appropriation data, etc.) Set Forth In Item 14, Pursuant To The Authority of FAR 43.103(b).**
☐	**C. This Supplemental Agreement Is Entered Into Pursuant To Authority Of:**
☐	**D. Other (Specify type of modification and authority)**

E. IMPORTANT: Contractor ☒ **is not,** ☐ **is required to sign this document and return _____ copies to the Issuing Office.**

14. Description Of Amendment/Modification (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

SEE SECOND PAGE FOR DESCRIPTION

Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. Name And Title Of Signer (Type or print)		16A. Name And Title Of Contracting Officer (Type or print)	
		LYNN M. BYRNE LYNN.M.BYRNE@US.ARMY.MIL (586)282-6553	
15B. Contractor/Offeror	**15C. Date Signed**	**16B. United States Of America**	**16C. Date Signed**
_____ **(Signature of person authorized to sign)**		**By** /SIGNED/ **(Signature of Contracting Officer)**	2013FEB06

SECTION A - SUPPLEMENTAL INFORMATION

Buyer Name: LISA M. KOSKI
Buyer Office Symbol/Telephone Number: CCTA-ASG-C/(586)282-9617
Type of Business: Large Business Performing in U.S.
Surveillance Criticality Designator: C
Weapon System: No Identified Army Weapons Systems
Kind of Modification: Change Order/Funding Action/Administrative Change

*** End of Narrative A0000 ***

PRIOR CONTRACT AMOUNT: $ 6,076,384.00
AMOUNT OF THIS ACTION: $ 41,382.00
TOTAL CONTRACT AMOUNT: $ 6,117,766.00

1. The purpose of this unilateral Modification 13 is to revise specifications for the DC bidirectional charger and add additional funding to implement these revisions.

2. As a result of Modification 13, the contract is hereby modified as follows:

a) Section B, CLIN 0014 is established and funded in the amount of $41,382.00(PRON R322C180R3).

b) Section C

i) C.4.2.10.2.e, language added (all additions are underlined)
ii)C.4.4, language added (all additions are underlined)

c) Section G is revised to add accounting and appropriations data for the funds being added under this Modification 13.

3. As a result of this Modification 13 the total contract value of W56HZV-09-D-0153/0002 is increased $41,382.00 from $6,076,384.00 to $6,117,766.00.

4. Except as provided herein, all other terms and conditions of this contract remain unchanged.

*** END OF NARRATIVE A0009 ***

Name of Offeror or Contractor: SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	SECTION B - SUPPLIES OR SERVICES AND PRICES/COSTS				
0014	MOD 13 SPEC. CHANGES GENERIC NAME DESCRIPTION: SAIC - Cost Overrun PRON: R322C180R3 PRON AMD: 03 ACRN: AC AMS CD: 63300553D00 *Added per Modification 13. (End of narrative B001) Inspection and Acceptance INSPECTION: Destination ACCEPTANCE: Destination Deliveries or Performance DLVR SCH REL CD: 001 — QUANTITY: 1 — PERF COMPL DATE: 30-MAY-2013 $ 41,382.00	1	LO		$ 41,382.00

SECTION C - DESCRIPTION/SPECIFICATIONS/WORK STATEMENT

C.1 Scope

This statement of work details the performance requirements for the design, development, building, delivery, testing, and demonstration of an integrated Micro Grid system set forth by the U.S. Army Tank Automotive Research Development and Engineering Center (Task Order Request for Proposal (TORFP) 0005, Alternative Energy Research (Micro Grid). The place of performance for this effort is Schofield Barracks, Oahu Hawaii.

C.1.2 The objective of this task order is for the contractor to design, develop, build, deliver, test and demonstrate a three tier Micro Grid with plug-in electric vehicles to determine the technical readiness of Micro Grids to accept power from various inputs (AC and DC) while charging the selected vehicles and provide output power to various applications in both AC and DC. The first tier of the Micro Grid shall be 60kW and transportable. The second tier of the Micro Grid shall be 150kW and semi mobile. The third tier of the Micro Grid shall be 250kW and stationary. The grid total output is expected to be 460kW. All three tiers shall work as one unit and have the capability to work independently. Each Micro Grid is expected to handle its individual generation and load. The management system shall be suitable for a wide range of applications, including peak shaving at the point of common connection to the grid, frequency or power factor regulation, ability to inject multiple energy sources into a 480V and 208V/120V 3P 3W or 4W loads, and capable of black-start situations from portable or permanently installed standby generators. The first and the second tier require an output voltage of 208V/120V. Eight inputs are required on the 250 kW Micro Grid and four inputs are required on each remaining Micro Grids. The AC and DC inputs shall be determined by the contractor. The system shall also provide benefits to local distribution grids. The stored energy can be used to reduce substation loading or it can be applied in a net-metering arrangement with on-site generators. It can also be applied to improve local power quality and reliability for a feeder or a specific customer.

The management system shall be compatible with Plug-in hybrid vehicles (PHEVs) capable of exporting power and recharging PHEVs when stored energy can be applied to a scalable Micro Grid solution that is capable of automatically configuring an islanded area to be served with locally stored energy when normal service is not available. Dynamic islanding is implemented upon loss of power to the feeder from the serving power source. Service is restored based upon load information captured before the loss of power and the amount of energy available in the battery system. The island is minimized as the battery system is depleted or power is restored to the feeder.

The focus areas are the efficient management of power, integration of renewable energy, energy storage, smart charging of plug-in electric vehicles and plug-in hybrid electric vehicles.

C.2 Background

As the Department of Defense (DoD) focuses on energy security and looks for ways to further reduce dependence on fossil fuels, there is a need to more efficiently manage the power it uses, and to supplement that power consumption with renewable sources. The utilization of Micro Grids with Bi-directional, universal, multi-ported, DC bus-bar based architecture with overarching generator, load management and transient ride through capability, will enable more efficient power management, thereby reducing petroleum consumption and renewable power generation by conditioning and distributing power into vehicle charging or grid distribution. Advanced energy storage will build further capability to use renewable energy sources. Micro Grids, renewable energy, and plug-in electric vehicles together offer a unique solution to address both energy security and fossil fuel consumption reduction goals.

C.3. Requirements

C.3.1 Task/Performance Summary:

Task 1: Three Tier Micro Grid Design, Develop System Architecture, Perform Trade Studies, Modeling, Topography Drawings, Static Display and Training Video, C.4.1
Task 2: Micro Grid System Elements, C.4.2
Task 3: Safety Engineering, C.4.3
Task 4: Testing/Demonstration/Evaluation, C.4.4
Task 5: Maintenance and Repair, C.4.5
Task 6: Training, C.4.6
Task 7: Program Management, C.4.7
Task 8: As Built Documentation, C.4.8
Deliverables, C.5
Options, C.6
Meeting Schedule, Project Reviews, and Status Updates, C.7
Government Furnished Equipment, C.8

C.4 Tasks

C.4.1 Task 1: Micro Grid Design, Develop System Architecture, Perform Trade Studies, Modeling, Topography Drawings, Static Display, and Training Video

The objective of Task 1 is for the Contractor to provide the Government with a Three Tier Micro Grid Design, Develop 3VSE System Architecture, System Modeling, Topography Drawings, Static Display, Training Video, and Perform Trade Studies including research of the latest advanced technology of batteries, as described in detail below:

C.4.1.1 Micro Grid Design

The Contractor shall generate and deliver, no later than six weeks after Task Order award, system schematics and mechanical renderings sufficient for detailed design and prototype build fabrication IAW CDRL A026. The design specifications shall apply at the component level. Engineering expertise shall be applied to ensure that the design complies with 3-View Systems Engineering (3VSE) artifacts and safety. 3VSE is a graphic-driven process modeled upon the Department of Defense Architecture Framework (DODAF). The 3VSE approach captures Operational, Functional, and Architectural system requirements and uses graphically based design artifacts to quickly and efficiently obtain a collective team understanding of user needs and system design, and aid program planning and technical decision-making. The Contractor shall submit system schematics as a class C or X for the AC and DC Power Modules showing physical layout and interconnect design.

C.4.1.2 Develop System Architecture

The Contractor shall create and deliver to the FTR, no later than one month after task order award, 3VSE artifacts, for the Micro Grid (MG) IAW CDRL A022. Based on the 3VSE artifacts submitted, the FTR shall select one artifact no later than three months after Task Order award. The System Architecture shall consist of the following:

C.4.1.2.1 System Boundary Diagram of input and output interaction of external systems and internal subsystems;

C.4.1.2.2 Operational Information Exchange Matrix mapping attributes of information exchanged between system nodes;

C.4.1.2.3 Operational Scenario Diagram of interconnected mission level activities triggered by external situations or events (i.e. blackouts or brownouts); including a hydrogen station, two storage buildings, and four vehicles.

C.4.1.2.4 Mission Scenario Diagrams with hierarchical depiction of the scenarios as a sequence of events and actions taken by mission applications to satisfy a system function;

C.4.1.2.5 Textural Requirements Capture describing functional requirements, and data elements required.

C.4.1.2.6 Top Level Block Diagram of the system architecture;

C.4.1.2.7 System Block Diagrams of components and subsystems included in this Statement of Work

C.4.1.2.8 System Schematics detailing physical characteristics of the integrated system architecture.

C.4.1.3 Perform Trade Studies

The Contractor shall perform a trade study to support Micro Grid design decisions and deliver IAW CDRL A006 to the FTR no later than two weeks after Task Order award. The trade study shall consist of the following areas, in support of major MG design decisions, as stated below:

C.4.1.3.1 The Contractor shall investigate recent advanced technology of DC energy storage including advantages and disadvantages.

C.4.1.3.2 The Contractor shall investigate current technologies of 50kW Solar systems including advantages and disadvantages.

C.4.1.3.3 The Contractor shall investigate current technologies of J1772 Vehicle to Grid interface selections including advantages and disadvantages.

C.4.1.3.4. The Contractor shall investigate current technologies of Vehicles, EV type, and conversion vendor selection including advantages and disadvantages.

C.4.1.3.5. The Contractor shall investigate the feasibility of integrating new technologies identified in C.4.1.3.1, C.4.1.3.2, C.4.1.3.3 and C.4.1.3.4 into the design of the Micro Grid.

C.4.1.4 Modeling

The Contractor shall develop and deliver, no later than two months after Task Order award, to the FTR, a Micro Grid model in accordance with CDRL A022 which shall verify system interfaces and control logic as described in detail below. The Contractor shall utilize the architecture and system design for entry into the simulation software and then incorporate the operation logic, develop scenarios and simulate the system control and logic flow. Activities shall include collecting data on subsystem logic and flow, and building system model.

C.4.1.4.1 Micro Grid Controls

The Contractor shall develop and deliver, no later than two months after Task Order award, a Simulink platform model of the Micro Grid

to facilitate optimization of system performance IAW CDRL A022. The term optimization of the Micro Grid system performance refers to size, volume, and weight of the Micro Grid as well as the number and size of generator sets and number of kW solar and wind is used. System modeling shall include subsystem logic and flow. The Contractor shall document the modeling and optimization results in the final report IAW CDRL A007.

C.4.1.4.2 Environmental Risk Factors

The Contractor shall analyze the impact of transport and ambient test site environmental risk factors on the Micro Grid system operation including all Micro Grid components and subsystems. The Points of analysis shall include temperature, shock and vibration, ambient weather conditions, solar radiation, fungus, and salt fog. Based on the information gathered in C.4.1.4.1 and C.4.1.4.2, the Contractor shall incorporate all feasible immediate preventative or corrective measures, as mutually agreed upon by the Contractor and COR, in the Micro Grid design. The Contractor shall document all recommendations for further ruggedness including documentation of the complete analysis in the final report IAW CDRL A007.

C.4.1.5 Topography Drawing

Upon completion of Micro Grid System Design, the contractor shall deliver a topography drawing, no later than three months after Task Order award, showing the Schofield Barracks in Oahu, Hawaii site layout with the Micro Grid equipment identified on the test site. This drawing shall represent the installation configuration with site preparation planned for the Micro Grid IAW CDRL A022. A target footprint for the dimensions of the grid does not exist.

C.4.1.6 Static Display

The contractor shall also deliver a Micro Grid poster board static display, no later than six months after Task Order award, for visualizing the proposed Micro Grid fabrication IAW CDRL A005. The display shall present insights into the Micro Grid installation and configurations. The purpose of the display is to help personnel with training on the Micro Grid configuration.

C.4.1.7 Training Video

The Contractor shall prepare, in contractor format, a ten minute training video configured as an educational training tool for evaluating Micro Grid physical deployment procedures. The video shall describe the Micro Grid characteristics and operation procedures. The video shall be used as a tool for evaluating Micro Grid physical deployment scenarios and configure total Micro Grid applications. Preparation and delivery of the training video shall be IAW CDRL A005 and delivered to the COR no later than twelve months after Task Order award.

C.4.2 Task 2: Micro Grid System Elements

The objective of Task 2 is for the Contractor to develop and deliver to the Government the Micro Grid design drawings as described in detail below. The Micro Grid system deliverables shall include all hardware and software.

C.4.2.1 Input Energy Sources

The Contractor shall develop a Micro Grid System which shall accept a range of eight input energy sources which consists of both Voltage Alternating Current (VAC) and Voltage Direct Current (VDC). The eight input energy sources include additional Micro Grids, diesel generators, renewable energy sources, and vehicles. All connections to the grid, generators, renewable, and vehicles, provided by the Contractor, shall provide protections including; over and under frequency and voltage, directional power and current, phase time and instantaneous over current, and ground and neutral time and instantaneous over current. Renewable connections shall utilize commercially available power and communication plugs. The Contractor shall provide the equipment with the capability of connecting to the Hawaii Electric Company (HECO). Renewable Sources as provided in paragraph C.4.2.8 shall be continuously monitored for voltage, current, power, power factor and other generated values, renewable parameters including temperature for solar, breaker status, control switch status, and emergency stop status. Voltage and frequency shall be continuously monitored to allow paralleling with any AC source available and shall provide the Contractor data to determine the maximum power output available. This energy shall be used to either augment the utility usage and billing, generate power for best fuel economy, or DC system charging. The software system shall decide how this energy shall be used. The Contractors trade study as described in C.4.1.3 shall determine the optimal energy storage method for this application, consisting of existing commercially available batteries, or a more advanced storage systems such as super-capacitors, or a combination. The Energy storage refers to the external sources to charge the vehicles batteries. Storage capacity shall accommodate a two-day full charge of four vehicles combined. The system shall be able to discharge at a rate that can sustain the micro-grid for short power outages or charge up to four vehicles simultaneously. Electrical energy storage applies to the 3rd tier; however, if the tiers were integrated, then it would apply to the other two tiers. Based on the trade study submitted by the Contractor in C.4.1.3 and IAW A006, The FTR will determine the optimal energy storage method.

An alternative energy storage system could include Hydrogen and a fuel cell. The contractor shall provide a fuel cell for this alternative.

C.4.2.2 Micro Grid Output Voltage

The Contractor shall meet the requirements of the Micro Grid output Voltage Alternating Current (VAC) bus of 480 Volt AC, 60 Hz, 3 Phase, at 250 kW.

C.4.2.3 Source and Load Management

The Contractor shall design and build the Micro Grid to interface with two 75 Kilo-watt (kW) generators, automatically and via the operator console, or Human Machine Interface (HMI). One 75 kW generator shall be purchased by the Contractor for Government ownership.

C.4.2.3.1 Human Machine Interface

The HMI shall provide the following functionality:

C.4.2.3.1.1 Continuous monitoring of all AC power and DC power inputs; including that from the DC bus-bar, for use in power management and power quality monitoring.

C.4.2.3.1.2 Continuous monitoring of all AC load outputs and DC loads for use in power management and quality monitoring.

C.4.2.3.1.3 Automatic detection of sources when they are connected to the MG.

C.4.2.3.1.4 Power balancing between available power output and loads shall be calculated and load management automatically performed. Load management includes dynamic shedding of discretionary loads when loading exceeds power output availability limits, reactivating shed load when available power output margins are obtained, and sequencing of diesel generation based on loading to maximize efficiency and minimize fuel consumption.

C.4.2.3.1.5 The AC generator shall be controlled and able to operate under various modes and configurations as described in C.4.2.3.2. Loading is subject to available power input by AC and DC power at any given instant unless energy storage is applied. Under running conditions, grid isolated power shall be used to charge vehicles and feed AC loads according to sensed loading conditions.

C.4.2.3.2 Micro Grid Operating Mode

The Contractor shall design and build the Micro Grid with capabilities of operating in various modes as stated below:

C.4.2.3.2.1 Single diesel generator, grid isolated, with and without DC sources or AC and DC loads.

C.4.2.3.2.2 Single DC source(s), grid isolated, without an AC source, with or without DC loads.

C.4.2.3.2.3 Multiple diesel generators, grid isolated, with and without DC sources or AC and DC loads.

C.4.2.3.2.4 Single diesel generator, grid interconnected, with and without DC sources, AC and DC loads.

C.4.2.3.2.5 Single DC source(s), grid interconnected, without an AC source, with and without AC and DC loads.

C.4.2.3.2.6 Multiple diesel generators, grid interconnected, with and without DC sources or loads. DC loads refer to the batteries, storage, or vehicles. DC output voltage shall be determined by the contractor.

C.4.2.3.3 Power Quality Monitoring

The Contractor shall provide a power quality monitoring system. The Micro Grid shall decide if the power quality is determined unacceptable and take action to correct power quality. The general practice for industry is that the total harmonic distortion has to be less than 5%.

C.4.2.3.4 Safety Devices

The Contractor shall provide safety devices for sources and loads to be manually tripped and locked out. Critical control power shall be automatically provided from the best available source through a transfer switch.

C.4.2.3.5 System Monitoring

The Contractor shall provide a control condition system which shall be capable of monitoring status diagnostics, and alarming for abnormalities as described below:

C.4.2.3.5.1 DC controls, DC switches, DC circuit breakers, DC protection.

C.4.2.3.5.2 AC controls, AC switches, AC circuit breakers, AC protection.

C.4.2.3.5.3 Generation controls, switches, breakers, and protection.

C.4.2.3.5.4 Vehicle controls, breakers, and protection.

C.4.2.3.6 Human Machine Interface (HMI)

The Contractor shall provide a HMI capable of metering power parameters (e.g., volts, amps, watts) which shall be viewable on the HMI. The HMI shall maintain a sequence of events log for maintenance and troubleshooting purposes. The HMI shall provide operators, step-by-step instructions for system startup and connection of sources and loads. The HMI shall also include operator step-by-step instructions for system maintenance and troubleshooting.

C.4.2.3.7 Design and Build Load Panel

The Contractor shall design and build a load/breaker panel to be used as the interface with smart circuit breakers to the Micro Grid structure loads. Maximum load shall be 200kW. Primary load control shall be achieved via dynamic load shedding, or smart, controllable distribution panels at the 480 VAC and 208/120 VAC levels. When load control is implemented, small loads in the smart distribution panels shall be incrementally switched on and off to achieve optimum power balance with the combined AC and DC input sources to the Micro Grid. The Contractor shall deliver to Schofield Barracks, Oahu, Hawaii, no later than six months after Task Order award, one full set of this equipment. Smart panels shall have similar form, fit, and function of the fielded Power Distribution and Illumination System, Electrical (PDISE).

C.4.2.3.8 Electric Power Quality

The electric power quality of the Micro Grid VAC output voltage wave form, under all steady state and transient load conditions, shall be compatible with the electronics-based loads at the Schofield Barracks in Oahu, Hawaii.

C.4.2.3.9 Micro Grid System Reliability

The Micro Grid shall have "smart" self-monitoring, control, protection, and local and remote communications capabilities to facilitate system reliability and performance possible, even under single-failure scenarios.

C.4.2.3.10 Remote Monitoring of Micro Grid

The Micro Grid shall be capable of being operated remotely by the local electric service provider or other third parties. Third party remote monitoring and operation capability shall consist of a software application that is accessible to a third party PC with internet access.

C.4.2.3.11 Monitoring Voltage and Frequency

Voltage and frequency shall be monitored to allow paralleling with any available 60Hz AC source, or source conditioned to 60Hz, and shall provide the maximum power output possible. Vehicles shall be operated in groups or alone to maintain the maximum fuel efficiency possible, thus reducing fuel usage. This energy shall be used to augment utility usage, manage generator power for best fuel economy, or charge DC systems.

C.4.2.3.12 Micro Grid Connectivity Devices

The Micro Grid shall incorporate the required VAC and VDC input and output energy source electromechanical "connectivity devices" and cables necessary from the wide-range of dispersed energy sources to integrate their energy resources into the Micro Grid equipment. The connectivity devices shall be compatible with the Micro Grid operation at electrical low voltage, high voltage buses, and alternate energy sources.

C.4.2.3.13 Utilization of Commercial off the Shelf (COTS) Subsystems

The Contractor shall utilize COTS subsystems with minimal modifications for manufacture of the Micro Grid, and shall minimize demonstration risk factors by acquiring subsystems early in the schedule in order meet Micro Grid delivery schedule of no later than six months after Task Order award. The Contractor shall construct the Micro Grid module utilizing established commercial construction standards.

C.4.2.4 MG Hardware

The Contractor shall provide power modules and sub-components, power inverters, cables and all other items installed in the power modules.

C.4.2.5 Set Up and Verify Micro Grid

The Contractor shall set up the Micro Grid and perform system integration. The Contractor shall verify system operation prior to shipment to Schofield Barracks in Oahu, Hawaii.

C.4.2.6 Support System Evaluation

The Contractor shall conduct the Micro Grid system demonstration and monitoring at Schofield Barracks, Oahu, Hawaii for one (1) month followed by long-term evaluation and monitoring. Remote continuous monitoring shall be used during the evaluation and monitoring period of 12 months following the demonstration. System inspection, upkeep, and maintenance shall be performed every month, one (1) week in duration, during the evaluation period. The DoD will not provide any accommodations for the Contractor while working in Hawaii.

C.4.2.7 Power Storage Equipment

The Contractor shall purchase and provide power storage equipment (batteries, or capacitors) large enough to handle a two-day full charge of each battery of the four vehicles as determined by the FTR from the related trade study findings in paragraphs C.4.1.3 and C.4.2.1, The vehicles shall be charged from empty state of charge to full twice. There is no associated drive cycle.

C.4.2.8 Solar/Wind Power Input

The Contractor shall deliver and install at the Schofield Barracks test site in Oahu, Hawaii a ground mounted solar power system with a 50 kW Photo Voltaic (PV) array supported by a carport structure. The first 25kW Photo Voltaic (PV) supported by a carport structure should be delivered no later than six months after Task Order Award. The remaining 25KW Photo Voltaic (PV) array supported by a carport structure should be delivered no later than ten months after Task Order award. The PV array shall be a polycrystalline solar laminates. The system shall be integrated with the Micro Grid installation.

C.4.2.8.1 Solar Power Input and Generator Power Input

The Contractor shall purchase and deliver one stationery 75kW diesel generator set to Schofield Barracks, Oahu, Hawaii. The solar power system shall support a 50kW system as described in paragraph C.4.2.8. The PV array shall be a polycrystalline solar laminates. The one generator shall be delivered no later than six months after Task Order award and shall be a deliverable to the Government.

C.4.2.8.2 Reserved

C.4.2.9 Micro Grid System Manager Station with Software

The Contractor shall deliver and install the Energy Manager Software no later than six months after Task Order award and IAW CDRL A023 at the Schofield Barracks in Oahu, Hawaii and shall provide status reporting and a user interface for the Micro Grid performance. The Contractor shall deliver and install a Portable PC as the platform for this system. The Energy Manager Software and Portable PC shall be delivered no later than six months after Task Order award.

C.4.2.9.1 Configure System Manager Software

The Contractor shall configure the Energy Manager Software and HMI user interface for the Micro Grid design to reflect the planned loads and generators available within the Micro Grid IAW CDRL A023. Required hardware and software interfaces shall be defined during the Micro Grid design phase. The Contractor shall tailor the Energy Manager product to the Micro Grid configuration. The Contractor shall configure the System Manager PC to run the Energy Manager and Vehicle Maintenance Software. This also includes design and development of the vehicle maintenance data collection interface used to download vehicle operating history and parameters, and to establish reporting tools for the data.

C.4.2.9.2 System Status Manager Station

The Contractor shall integrate the System Status Manager Station with the Micro Grid control station and verify reporting functions for maintenance data, and Micro Grid status. The Contractor shall document the tailored design for configuration management control IAW CDRL A023.

C.4.2.10 Vehicles and Charging Stations

The Contractor shall provide Two Converted Vehicles and Charging Stations as described in detail below:

C.4.2.10.1 Converted Vehicles

The Contractor shall purchase and deliver, no later than nine months after Task Order award, two converted vehicles to TARDEC, Warren, MI. The vehicles shall be either two Medium Duty Pickup trucks or SUV with a minimum 25 kilowatt-hours of battery storage each, typical driving range per charge shall be 100 miles on a level drive cycle. The Contractor shall convert all vehicles from gas or diesel powered to either plug-in hybrid electric vehicles (PHEV) or plug-in electric vehicles (PEV). This includes replacement of the power system and other systems with electric power generation and electromechanical conversion systems. All vehicles are required to export as well as import power. Vehicles shall meet FMVSS Federal Motor Vehicle Safety Standards (FMVSS) and Original Equipment Manufacturer (OEM) regulations.

C.4.2.10.2 Charging Stations

The Contractor shall develop and deliver, no later than six months after Task Order award, Micro Grid compatible charging stations to accommodate two PHEV and PEV vehicles described in C.4.2.10.1 and an additional two vehicles. Vehicle connections shall be made using commercially available J1772 (AC Level 2: 240 V, 1 phase, up to 80A required) compliant power and communication plugs. All of the charging stations shall include both; charging and discharging stations. The charging station shall allow for the following:

(a) Adjacent to the four vehicles provided in C.4.2.10.1 when parked
(b) Four chargers with bi-directional capability
(c) Interconnections to MG
(d) Local serial port, HMI, and wireless cell communications for charger/V2G

*** (e) The DC bidirectional charger for Smith Electric vehicles should be moved inside the locked gate adjacent to solar carport #2 at Schofield Barracks.

The Contractor shall continuously monitor the two vehicles or the following:

C.4.2.10.2.1 Voltage, current, power, power factor and other generated values;

C.4.2.10.2.2 Vehicle parameters including battery levels, engine temperatures (for PHEVs), and maintenance intervals;

C.4.2.10.2.3 Breaker status;

C.4.2.10.2.4 Control switch status; and

C.4.2.10.2.5 Emergency stop status.

C.4.3 Task 3: Safety Engineering

C.4.3.1 Safety Analysis and Assessment

The Contractor shall perform Micro Grid system safety assessment using STD-882D and DI-SAFT-80102B as guides. The assessment shall be conducted to ensure that the Micro Grid will operate safely during test, transportation, and field deployment. The Contractor shall develop and deliver a Safety Assessment Report (SAR), to the FTR no later than five months after Task Order award, including a comprehensive hazard analysis and steps to reduce hazards and ensure crew safety including shock and flash hazard analysis IAW CDRL A024. The Contractor shall specify risk mediation design features and operating procedures. The Contractor shall identify Limited, Restricted, and Prohibited Approach Boundary for shock protection. The Contractor shall detail all required use of personal protective equipment. The Contractor shall support review of safety documents and review design artifacts and deliverables to ensure that Safety remediation has taken place per the completed SAR.

C.4.4 Task 4: Testing/Demonstration/Evaluation

C.4.4.1. Prepare Test Plans

The Contractor shall develop Test Plans IAW CDRL A025 to prove that the Micro Grid meets the requirements set forth in C.4 of this SOW, and submit to the FTR, in advance of developing the Micro Grid, for Government approval. The Government shall have two (2) weeks to review and accept the plan. The draft test plan shall be submitted one month prior to the Final Design Review The final test plan shall be agreed upon at the Final Design Review as stated in paragraph C.7.2 at the Contractors facility. Tests shall include integration and operational tests. Test plans shall detail testing instrumentation; data collection methodology, facilities and personnel needed, and pass or fail criteria.

C.4.4.2 System Verification

The Contractor shall verify Micro Grid operation prior to shipment, installation and set-up in Schofield Barracks, Oahu, Hawaii. The Contractor shall verify performance parameters with sources and loads representing maximum capacities called out in the specification.

C.4.4.3 Shipment of Equipment to the Schofield Barracks in Oahu, Hawaii

The Contractor shall package and ship the MG system to Hawaii in accordance with standard commercial packaging.

*** C.4.4.4 Site Preparation and Installation for MG

The Contractor shall install no later than six months after Task Order award, the Micro Grid at Schofield Barracks, Oahu, Hawaii. The contractor shall develop and deliver, for Government concurrence, Hawaii site preparation drawings, as identified in paragraph C.4.1.5, and required documents for receipt and installation of the Micro Grid hardware. The Government shall have two (2) weeks to review and accept the drawings. All electrical devices shall be installed in accordance with National Electric Code (NEC). A permanent fence should be added to the installation at Schofield Barracks and should surround the AAMG2 equipment. That change is based on the physical security from Schofield's DPW's recommendation and will add the additional protection for the people who are not familiar with the high voltage. Total estimated cost The Contractor shall also provide no later than six months after Task Order award, all required labor and material for all equipment foundations, wiring, monitoring, communications, and coordination when connecting to the site.

C.4.4.5 Perform System Test, Demonstration and Validation

The Contractor shall perform a System Capability Demonstration at the Schofield Barracks test site in Oahu, Hawaii immediately after Micro Grid system checkout, which shall begin no later than six months after Task Order award. The Contractor shall demonstrate all primary system functions including inputs and outputs, performance, and human interface operations. The Government reserves the right to witness and observe all testing at the Contractors facility or at Schofield Barracks, Oahu, Hawaii. The Contractor shall provide the FTR with the detailed test schedule at the Start Meeting. The project timeline includes six months to design and build the Micro Grid and 12 months to perform system test, demonstration, and validation.

C.4.4.6 Long Term System Evaluation

The Contractor shall be responsible for Micro Grid operation, recording of data, and performance of the Micro Grid system for the duration of the twelve (12) month evaluation period. Daily monitoring, data logs, and resource tracking shall be performed as described in paragraph C.4.2.10.2 and paragraph C.4.2.3.5. The Contractor shall deliver daily monitoring logs, general system operation status checklists, data logs, preventative and corrective maintenance logs, corrective action reports, and a summary of progress made on Task 4 on a quarterly basis IAW CDRL A027. The Contractor shall conduct bi-weekly status teleconferences with the Government to review any data and performance issues. The Contractor shall develop a final system evaluation report for delivery at the close of the evaluation period, including recommendations on how to revise the design for operational adoption of the Micro Grid IAW CDRL A007.

C.4.5 Task 5: Maintenance / Repair

The objective of Task 5 is to provide on-site troubleshooting and maintenance for the Micro Grid in Oahu, Hawaii as explained in detail below. In addition to the reporting and update requirements below, the contractor shall provide a summary of progress made on Task 5 in the Quarterly Technical Report IAW CDRL A027.

C.4.5.1 24 Hour Site Response

The Contractor shall provide 24-hour site response by contacting the facility Engineer either via e-mail, phone call, or face-to-face discussion of problems encountered (such as subsystem failure, lack of power to the grid) with the Micro Grid system in Hawaii. The Contractor shall be contacted, via e-mail, phone call, or in person, by the facility Engineer of any problems; the Contractor shall record any problems discovered and verbally report this information at the bi-weekly telephone status teleconferences as described in C.4.4.6

C.4.5.2. Warranty Support:
The Contractor shall provide Micro Grid warranty support during the performance period of the Task Order. The warranty shall include all labor and materials to support the continuous operation of the Micro Grid.

C.4.6 Task 6: Training

C.4.6.1 The Contractor shall conduct training classes for five trainees for two workdays, no later than nine (9) months after Task Order award, at Schofield Barracks in Oahu, Hawaii. A workday is defined as eight hours. The Contractor shall develop a power point presentation, utilizing existing commercial equipment operating manuals, for the purpose of training the five employees in the step by step operation and maintenance of the Micro Grid equipment. These training classes shall be conducted so that five Government personnel have been trained to operate and maintain the Micro Grid equipment. The training and manual shall include the following:

Equipment Description
- Technical Principles of Operation

Operators Instructions
- Connecting Sources
- Setup Sources
- Setup Loads
- Manual Operation
- Automatic Operation
- Operation under Unusual Conditions

Maintenance Instructions
- Micro Grid
- Diesel Generator Set
- Wind Generator
- Solar PV
- Vehicles

C.4.7 Task 7: Program Management

C.4.7.1 Program Management Functions
The Contractor shall perform all necessary program management functions to facilitate the design, development, demonstration, and evaluation periods. The Contractor shall conduct the system demonstration. The Contractor shall review status and issues with the Government by e-mail, a phone call, or face to face and shall be reported in the Monthly Evaluation Report IAW CDRL A014. The Contractor shall submit to the FTR, on a quarterly basis, a Quarterly Technical Report IAW CDRL A027, and Quarterly Financial Reports IAW CDRL A011.

C.4.7.2 Site Survey
The Contractor shall perform a Site Survey at Schofield Barracks, Oahu, Hawaii in order to develop the Topography Drawing in paragraph C.4.1.5.

C.4.7.3 Configuration/Data Management
The Contractor shall deliver to the Government all program documents and technical data in .PDF or MS Windows compatible format.

C.4.7.4. Quality Engineering
The Contractor shall monitor program execution to comply with the Quality Assurance Surveillance Plan. The Contractor shall perform quality reviews and audits IAW CDRL A027.

C.4.8. Task 8: As Built Documentation

C.4.8.1 "As Built" Documentation and Improvement Recommendations
The Contractor shall deliver the "as built" documentation and improvement recommendations which shall include documented changes and final recommendations as part of the Final Scientific and Technical Report (A007).

C.5. Deliverables

C.5.1 Deliverables of Hardware

C.5.1.1 Deliverable of One Three Tier Micro Grid (MG) in containerized housing In accordance with paragraph C.1.2, C.4.2.

C.5.1.1.1 Inputs include:

(a) HECO Utility interface as described in C.4.2.1
(b) 25 kW PV solar array with all Micro Grid interconnection infrastructures as described in paragraph C.4.2.8
(c) Charging stations to accommodate four vehicles described in C.4.2.10.2.
(d) One 75 kW generator set as described in C.4.2.3 and C.4.2.8.1.

C.5.1.1.2 Outputs include:

(a) 250kW/480VAC grid interface with safety disconnects as described in C.1.2, C.4.2.1, C.4.2.3.4, and C.4.2.4.
(b) 150kW/ 208/120VAC grid interface with safety disconnects as described in C.1.2, C.4.2.1, C.4.2.3.4, and C.4.2.4.
(c) 60kW/ 208/120VAC grid interface with safety disconnects as described in C.1.2, C.4.2.1, C.4.2.3.4, and C.4.2.4.
(d) Distribution panel for local 480VAC loads as described in C.4.2.3.7.

C.5.1.1.3 Communications shall include local HMI Panel as described in C.4.2.3.1 and C.4.2.3.6.

C.5.1.2 Micro Grid System Manager Station (1 computer) IAW C.4.2.9.

C.5.1.3 Two converted vehicles as described in as described in C.4.2.10.1.

C.5.2 Data Deliverables IAW Section J, Exhibit A, CDRL Data Items:

C.5.2.1 Deliverable of Integrated Master Schedule and Program Management Plan

Integrated Master Schedule and Program Management Plan shall be delivered IAW CDRL A021 and paragraph C.7.1.

C.5.2.2 Deliverable of Quarterly Financial Report

Quarterly Financial Reports shall be delivered IAW CDRL A011 and paragraph C.4.7.1

C.5.2.3 Deliverable of Monthly Evaluation Reports

Monthly Evaluation Reports shall be delivered IAW CDRL A014 and paragraph C.4.7.1.

C.5.2.4 Deliverable of Design/Modeling Documentation

Design/Modeling Documentation shall be delivered IAW CDRL A022 and paragraphs C.4.1.1, C.4.1.2, C.4.1.4, C.4.1.4.1 and C.4.1.5.

C.5.2.5 Deliverable of Trade Studies

Trade Studies shall be delivered IAW CDRL A006 and paragraphs C.4.1.3, and C.4.2.1.

C.5.2.6 Deliverable of Quarterly Technical Reports

Quarterly Technical Reports shall be delivered IAW CDRL A027 and paragraphs C.4.4.6, C.4.5, C.4.7.1 and C.4.7.4.

C.5.2.7 Deliverable of Operation, Training, and Presentation Materials

Operation, Training, and Presentation Materials shall be delivered IAW CDRL A005 and paragraphs C.4.1.6, C.4.1.7.

C.5.2.8 Deliverable of Energy Manager Software

Energy Manager Software shall be delivered IAW CDRL A023 and paragraphs C.4.2.9, C.4.2.9.1, and C.4.2.9.2.

C.5.2.9 Deliverable of Safety Assessment Report

Safety Assessment Report shall be delivered IAW CDRL A024 and paragraph C.4.3.1.

C.5.2.10 Deliverable of Test/Demonstration Plans

Test/Demonstration Plans shall be delivered IAW CDRL A025 and paragraph C.4.4.1.

C.5.2.11 Deliverable of System Schematics and Mechanical Renderings

System Schematics and Mechanical Renderings shall be delivered IAW CDRL A026 and paragraph C.4.1.1.

C.5.2.12 Deliverable of Final Scientific and Technical Report

Final Scientific and Technical Report(s) shall be delivered IAW CDRL A007 and paragraphs C.4.1.4.1, C.4.1.4.2, C.4.4.6 and C.4.8.1.

C.5.2.13 Deliverable of Minutes (Start of Work, Design Review I (DRI), Design Review II (DRII)

Minutes (Start of Work, Bi-Weekly Meetings, Final Design Review) shall be delivered IAW CDRL A002 and paragraphs C.7.1 and C.7.2.

C.6. Options

C.6.1. Option 1: Additional Medium Duty Pickup or Van
The Contractor shall deliver one additional Medium duty Pickup truck or van with a minimum 60 kilowatt-hrs of battery storage. The Contractor shall convert the vehicle from gas or diesel powered to either plug-in hybrid electric vehicles (PHEV) or plug-in electric vehicles (PEV). This includes replacement of the power system and other systems with electric power generation and electromechanical conversion systems. The additional vehicles shall meet FMVSS and OEM regulations. The Contractor shall deliver the vehicle to Schofield Barracks, Oahu, Hawaii.

C.6.2. Option 2: Delivery of One additional 10kW mobile solar power generator system
The Contractor shall deliver one additional portable 10 kW solar power generator system as described in C.4.2.8.1. The portable solar power system shall supplement the installed 50kW system. The PV array shall be a flexible multi-junction thin film silicon solar laminate.

C.6.3. Option 3: Delivery of one additional 25kW mobile wind power generator system. The Contractor shall deliver one portable 25 kW wind power generator system as described in C.4.2.8.2. The portable wind power system shall supplement the installed 50kW solar system as described in C.4.2.8.

C.6.4. Option 4: One additional month of testing by the Contractor. The Contractor shall provide one additional month of remote testing to include one additional support trip to the evaluation site for system inspection, upkeep, and maintenance for a duration of one week as described in C.4.2.6. The additional month of testing consists of four 40-hour work weeks.

C.6.5 Option 5: Wind Power Input
The Contractor shall purchase and deliver one additional 25 kW wind power generator system, mounted on a trailer, to Schofield Barracks, Oahu, Hawaii no later than six months after Option award. The system shall be available for the duration of the evaluation period. The portable wind power system shall supplement the installed 50kW solar system as described in paragraph C.4.2.8. The generator sets shall be available for the duration of the test/demonstration/evaluation period. Upon completion of the Task Order effort, the government will take possession of the generators and Micro Grid.

C.6.6 Option 6: Solar Power Input and Generator Power Input
The Contractor shall purchase and deliver two additional 10 kW solar power generator systems, mounted on a trailer and one additional stationery 75kW diesel generator set to Schofield Barracks, Oahu, Hawaii. The solar power system shall supplement the installed 25kW system as described in paragraph C.4.2.8. The PV array shall be a flexible multi-junction thin film silicon solar laminates. The two 10kW portable solar PVs and the one generator shall be delivered no later than 29 June 2012_and shall be a deliverable to the Government.

C.6.7 Option 7: Converted Vehicles
The Contractor shall purchase and deliver, no later than nine months after option award, two converted vehicles to Schofield Barracks, Oahu, Hawaii to be used for the Micro Grid demonstration and evaluation. The vehicles shall be two Light/Medium Duty pickups or Sport Utility Vehicles with a minimum 60 kilowatt-hours of battery storage each, typical driving range per charge shall be 100 miles on a level drive cycle. The Contractor shall convert all vehicles from gas or diesel powered to either plug-in hybrid electric vehicles (PHEV) or plug-in electric vehicles (PEV). This includes replacement of the power system and other systems with electric power generation and electromechanical conversion systems. All vehicles are required to export as well as import power. Vehicles shall meet FMVSS Federal Motor Vehicle Safety Standards (FMVSS) and Original Equipment Manufacturer (OEM) regulations. The Contractor shall continuously monitor the two vehicles for the following: Voltage, current, power, power factor and other generated values; Vehicle parameters including battery levels, engine temperatures (for PHEVs), and maintenance intervals; Breaker status; Control switch status; and Emergency stop status.

C.6.8 Option 8: Solar/Wind Power Input
The Contractor shall deliver and install at the Schofield Barracks test site in Oahu, Hawaii a ground mounted solar power system with a

minimum 25 kW Photo Voltaic (PV) array. The PV array shall be a solar laminate. The system shall be integrated with the Micro Grid installation. See paragraph C.4.2.1, which specifies how the renewable sources shall be monitored.

C.7. Meeting Schedule, Project Reviews, and Status Updates

C.7.1 Start of Work Meeting

The Contractor shall initiate, plan, coordinate and conduct at a one (1) day Start of Work Meeting with the Government within fourteen (14) days of the award of the Task Order. The meeting shall take place at TARDEC, Warren Michigan. The Government and Contractor shall mutually agree to date, time, and location of the meeting. The Contractor shall develop and deliver an Integrated Master Schedule and Program Management Plan identifying the means to accomplishing the tasks detailed in this Statement of Work in accordance with CDRL A021. In addition, the Contractor shall document the planned schedule and milestones to complete these tasks. The Contractor shall deliver, electronically, minutes from the Start of Work Meeting in accordance with CDRL A002.

C.7.2 Final Design Review (FDR)

Prior to the commencement of the initial fabrication, but no later than 90 days after contract award, the Contractor shall plan and conduct a FDR at the Contractors facility. The Contractor shall coordinate and conduct the Final Design Review with the Program Management Team (PMT), including all relevant Contractor and Government project personnel. The Contractor shall present the design to the FTR for Government review and comment. Based on the comments from the Government, the Contractor shall incorporate all necessary requirements and changes. The Contactor shall document, track, and manage all necessary project action items, meeting agendas, and meeting minutes and deliver in accordance with CDRL A002.

C.8 Government Furnished Equipment

The Government does not intend to provide Government Furnished Equipment for this effort.

***Revised by Modification 13

*** END OF NARRATIVE C0001 ***

Name of Offeror or Contractor: SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

SECTION G - CONTRACT ADMINISTRATION DATA

LINE ITEM	PRON/ AMS CD/ MIPR	OBLG STAT	JO NO/ ACCT ASSIGN	ACRN	PRIOR AMOUNT	INCREASE/ DECREASE	CUMULATIVE AMOUNT
0014	R322C180R3 63300553D00	1	22C180	AC	$ 0.00	$ 41,382.00	$ 41,382.00
					NET CHANGE	$ 41,382.00	

ACRN	ACCOUNTING CLASSIFICATION				INCREASE/ DECREASE
AC	21	22040000026N6N7EP633005255Y	S20113	W56HZV	$ 41,382.00
				NET CHANGE	$ 41,382.00

	PRIOR AMOUNT OF AWARD	INCREASE/DECREASE AMOUNT	CUMULATIVE OBLIG AMT
NET CHANGE FOR AWARD:	$ 6,076,384.00	$ 41,382.00	$ 6,117,766.00

LINE ITEM	ACRN	EDI/SFIS ACCOUNTING CLASSIFICATION					
0014	AC	21	121320400000	W56HZV	26N6N7E63300553D00255YR322C180R3	22C180	S20113