

ANNEX  
BETWEEN  
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
GLENN RESEARCH CENTER  
AND GLOBAL ENERGY CORPORATION  
UNDER SPACE ACT UMBRELLA AGREEMENT  
NO. SAA3-1529, DATED 01-08-18 ANNEX NUMBER 01

ARTICLE 1. PURPOSE

This Annex shall be for the purpose of developing a 10 kW thermal power source that can be scaled to 100 kWt and encompasses the test and evaluation of power generators up to 100 Wth. This phase will utilize existing facilities and equipment at Plum Brook Station. Specifically, Phase 1 work will be accomplished with buildup and analysis work at the Chem Lab 7143, and operation of the generator in the CCL Interconnect Building 2932.

The legal authority for this Annex, consistent with the Umbrella Agreement, is in accordance with the National Aeronautics and Space Act (51 U.S.C. § 20113).

ARTICLE 2. RESPONSIBILITIES

A. NASA GRC will use reasonable efforts to:

1. Identify required facility modifications/augmentations, implement changes, and verify system functionality.
2. Provide all required fluid lines between the facility systems and the appropriate test article interfaces consistent with all specified requirements (such as commodity, pressure, temperature, flowrate, line cleanliness, filtration, interface loads, et cetera).
3. Provide the electrical power and both electrical and data harnesses to the test article interfaces.
4. Provide all facility instrumentation.
5. Provide Data Acquisition and Facility Control Systems as required to meet the test article, facility, and STE requirements. This includes processing data in a data format usable for NASA and GEC review and analysis.
6. Supply consumables for generator operation, consistent with identified fluid specifications.
7. Supply facility crews to perform facility operations, facility test cell support, and test cell maintenance.
8. Integrate the communication and data harnesses provided by GEC.
9. Supply office space for GEC resident employee, and GEC onsite test support employees.
10. Participate on Safety/Data Reviews for the test phase.
11. Provide the control systems for remote operation, if necessary.
12. NASA will provide fume hoods in the Chemistry Laboratory Building 7143. Fume hoods in 7143 are for running post-operation diagnostics and analysis.
13. NASA will provide fume hoods in the Cryogenic Components Laboratory, CCL. Hybrid generator assembly and operation will occur in the CC 2932 building.

14. GRC will supply diagnostic equipment that resides currently in the Chem Lab, as well as access to workbenches for preparing test articles and components to be assembled in the CCL.

B. Partner will use reasonable efforts to:

Responsibilities of the GEC Team include:

1. Provide the generator for testing.
2. Provide all generator source materials (fuels).
3. Provide all test article specific procedures, (including handling and installation procedures, test instrumentation installation, inspections, et cetera).
4. Provide all test documentation such as test plan, test matrix, test requests, and TRD.
5. Provide a hazards analysis of the test article.
6. Provide shipping of materials to test facility.
7. Provide detailed information on the type and location of all interface connectors as well as the expected static and dynamic loading at all structural interfaces.
8. Provide review of all test facility designed STE.
9. Provide test article fluid interface requirements.
10. Perform safety/data reviews for each test as required.
11. Will provide communication requirements and data harnesses if required.
12. Provide Material Safety Data Sheets, in advance, for all chemicals brought onto test site.
13. Support one safety review and one operational readiness review prior to testing.
14. Provide the power conversion hardware (Stirling Engine or thermoelectric).
15. Shielding calculations and facility requirements.
16. GEC will provide any required, generator-specific mechanical STE such as: hardware protective shields, power conversion hardware: thermoelectric or Stirling Engine.
17. GEC will provide any required, generator-specific electrical STE such as: sensors, generator connectors, electromagnets etc.

### ARTICLE 3. SCHEDULE AND MILESTONES

The planned major milestones for the activities for this Annex defined in the "Responsibilities" Article are as follows:

- |  |                            |
|--|----------------------------|
| 1. GEC to transfer equipment to Lewis Field.   | On or about<br>02/02/2018. |
| 2. NASA GRC to complete setup for running cells in Chem Lab.                         | On or about<br>03/28/2018. |
| 3. The Parties to jointly identify desirable fuel material.                          | On or about<br>05/31/2018. |
| 4. NASA GRC to demonstrate Excess power (less than 10 Wth) demonstrated at Chem Lab. | On or about<br>09/30/2018. |
| 5. Excess power demonstrated (less than 100 Wth) at Chem Lab.                        | On or about<br>12/30/2018. |

#### ARTICLE 4. FINANCIAL OBLIGATIONS

A. Partner agrees to reimburse NASA an estimated cost of \$341,104.00 for NASA to carry out its responsibilities under this Annex. The Partner agrees to pay NASA GRC \$341,104.00 over the course of Phase 1 work.

Initial payment shall be in the amount of \$20,000.00 to be paid within one month of the Effective Date of this Annex.

The remaining amount would be distributed in four equal payments according to the schedule below.

1. GEC to pay NASA \$78,000.00 after completion of lab design review, (approximately 45 days after Effective Date of this Annex).
2. GEC to pay NASA \$78,000.00 after successful completion of Test Readiness Review (TRR).
3. GEC to pay NASA \$78,000.00 60 days after test operations begin.
4. GEC to pay NASA \$87,104.00 after demonstration of excess power (less than 10Wth).

Each payment shall be marked with [insert GRC and Annex No. 01].

B. NASA will not provide services or incur costs beyond the current funding. Although NASA has made a good faith effort to accurately estimate its costs, it is understood that NASA provides no assurance that the proposed effort under this Annex will be accomplished for the estimated amount. Should the effort cost more than the estimate, Partner will be advised by NASA as soon as possible. Partner shall pay all costs incurred and have the option of canceling the remaining effort, or providing additional funding in order to continue the proposed effort under the revised estimate. Should this Annex be terminated, or the effort completed at a cost less than the agreed-to estimated cost, NASA shall account for any unspent funds within 150 calendar days after completion of all effort under this Annex, and promptly thereafter, at Partner's option return any unspent funds to Partner or apply any such unspent funds to other activities under the Umbrella Agreement.

#### ARTICLE 5. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. Data produced under this Annex which is subject to paragraph C. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement will be protected for the period of three years.

B. Under paragraph H. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement, Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data provided.

1. Background Data:  
None.

2. Third Party Proprietary Data:

None.

3. Controlled Government Data:

None.

4. The following software and related Data will be provided to Partner under a separate Software Usage Agreement:

None.

#### ARTICLE 6. TERM OF ANNEX

This Annex becomes effective upon the date of the last signature below ("Effective Date") and shall remain in effect until the completion of all obligations of both Parties hereto, or one year from the Effective Date, whichever comes first, unless such term exceeds the duration of the Umbrella Agreement. The term of this Annex shall not exceed the term of the Umbrella Agreement. The Annex automatically expires upon the expiration of the Umbrella Agreement.

#### ARTICLE 7. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Annex by providing thirty (30) calendar days written notice to the other Party.

#### ARTICLE 8. POINTS OF CONTACT

The following personnel are designated as the Points of Contact between the Parties in the performance of this Annex.

##### Management Points of Contact

##### NASA

Gerald Hill

Facility Manager, Plum Brook Station

Mail Stop: PB

21000 Brookpark Road

Cleveland, OH 44135

Phone: 419-621-3235

Fax: 419-621-3266

gerald.m.hill@nasa.gov

##### Global Energy Corporation

Lawrence P. Forsley

SVP/CTO for Global Energy Corporation

5101B Backlick Rd.

Annandale, VA 22003

Phone: 703-216-5566

Fax: 703-256-8704

larryforsley@gmail.com

#### ARTICLE 9. MODIFICATIONS

Any modification to this Annex shall be executed, in writing, and signed by an authorized representative of NASA and the Partner. Modification of an Annex does not modify the terms of the Umbrella Agreement.

#### ARTICLE 10. SIGNATORY AUTHORITY

The signatories to this Annex covenant and warrant that they have authority to execute this Annex. By signing below, the undersigned agrees to the above terms and conditions.

NATIONAL AERONAUTICS AND  
SPACE ADMINISTRATION  
GLENN RESEARCH CENTER

BY: 

Janet L. Kavandi, Ph.D.  
Center Director

DATE: 01/08/2018

GLOBAL ENERGY CORPORATION

BY: 

Dr. Jay W. Khim  
CEO, Global Energy Corporation

DATE: 12/20/2017