

# Department of the Navy SBIR/STTR Transition Program

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Approval # 43-1256-16

Topic # N13A-T017

High-Temperature Metamaterial Emitter For Thermophotovoltaics

Physical Sciences Inc.

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** Potentially Expeditionary Power Systems Program Office

**Transition Target:** Next generation generator

**TPOC:**

Dr. Mark Spector

[mark.spector@navy.mil](mailto:mark.spector@navy.mil)

**Other transition opportunities:** > Army PM for Expeditionary Energy & Sustainment Systems (E2S2)  
> Army PM for Soldier Warrior (SWAR)  
> NASA Radioisotope Thermoelectric Generator (RTG)

- **Example mission:** 5 crew, 72 hours, 10W average power use per person



2590 Li+ battery x 20  
28kg, 4.2 kW-hr (150 W-hr/kg)

- > All solid state – less maintenance and repair
- > Silent operation

2015 Physical Sciences Inc.

## WHAT

**Operational Need and Improvement:**

- > Increase weight savings by 30%
- > Reduce maintenance costs (All solid state)
- > Reduce noise
- > Reduce logistics burden

**Specifications Required:**

- > Man portable
- > ~1000W
- > Runs on JP-8

**Technology Developed:**

- > Novel high temperature emitter improves fuel to electrical conversion efficiency

**Warfighter Value:**

- > Silent Operation
- > Used in Unmanned Underwater Vehicles
- > Used in Unattended Aerial Vehicles (UAV)
- > Used in Warrior Portable Power

## WHEN

**Contract Number:** N00014-15-C-0041 **Ending on:** August 9, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Demonstrate >30% conversion efficiency	Med	Efficiency > 20%	4	March 2016
Fabricate large scale TPV cell	Med	reproduce current performance levels	4	September 2016
Integrate enhanced emitter with TPV cell	Med	functional demo unit	4	March 2017
Integrate coverter unit with combustor	Med	functional prototype	4	December 2017
Add balance of plant	Low	functional prototype generator	4	June 2018

## HOW

**Projected Business Model:**

- > License technology or supply component technology to DoD prime contractor

**Company Objectives:**

- > Provide technology solutions and innovative products to our government and commercial customers.

**Potential Commercial Applications:**

- > Residential combined heat and power
- > Remote site generators (oil industry)

**Contact:** Joel Hensley, Area Manager

[Hensley@PSICorp.com](mailto:Hensley@PSICorp.com)

(978) 738-8128