

# Department of the Navy SBIR/STTR Transition Program

Pending PAO Approval

Topic # N131-019

Non-Mechanically Moving Solar Directing System for Photovoltaic Modules

TIPD, L.L.C.

## WHO

**SYSCOM:** NAVFAC

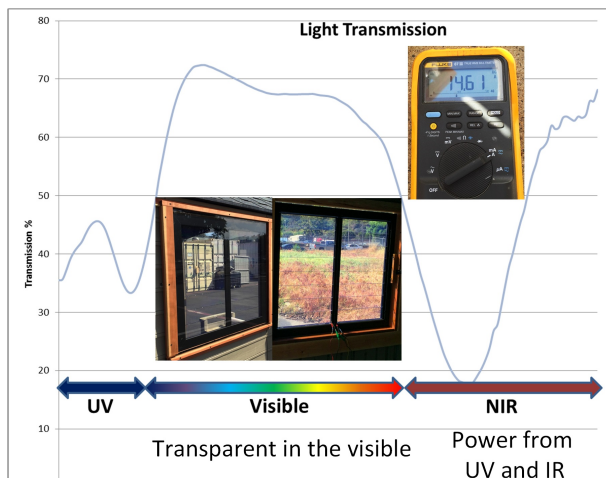
**Sponsoring Program:** NAVFAC  
Directed Energy Program

**Transition Target:**

**TPOC:**

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**Other transition opportunities:** All DoD branches would benefit from TIPD's technology. While the Navy has an aggressive target for power from alternative sources, all DoD facilities fall under the Presidential directive to achieve 30% of their power from alternative sources by 2025.



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## WHAT

**Operational Need and Improvement:** The Navy needs to continue to implement higher performing PV systems with a minimal increase in operations and maintenance cost compared to that of fixed-tilt PV systems. The DoN is committed to producing at least 50% of shore-based energy requirements from alternative sources and at least 50% of DoN installations will be net-zero by 2020. By 2020, the Navy is committed to providing at least 50% of the total DoN energy consumption through alternative sources. TIPD's technology provides a new source of solar energy by converting the windows into solar collection systems without impacting the view or visual appearance. The windows are optimized for south-facing installations but can be modified for east and west facing installations. The system has no moving parts and will not require adjustment to maximize the solar collection.

**Specifications Required:** Develop a novel and high performance solar collecting system that implements non-mechanical solar tracking to increase energy production. The technology is implemented in a window configuration using holographic gratings to increase angular collection across seasons and during the day.

**Technology Developed:** TIPD's implementation of the solar windows uses a combination of two optical techniques, diffraction and total internal reflection, to trap the ultraviolet (UV) in infrared (IR) portions of the spectrum inside a glass window. The trapped light is directed toward PV cells located within the window where the diffract light is converted into electricity. The visible light passes through the window and provides a minimally obstructed view. The novel implementation provides a visually appealing transparent window. The holograph optical elements that collect the UV and IR light provide higher angular collection of the direct solar radiation during the course of the day and year providing better energy generation balance. Since the window has no moving parts, maintenance is greatly reduced.

**Warfighter Value:** The solar windows could provide an additional source of alternative energy in domestic installation and remote facilities.

## WHEN

**Contract Number:** N39430-14-C-1508 **Ending on:** September 30, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Demonstrate prototype 600mm x 600mm window with > 70W/m2	N/A	Demonstrated assembled windows and power measurements in TIPD's Oceanside, CA facility	5	June 2015
Demonstrate commercial size 1m2 window with > 70W/m2 (Wpp > 45W/m2)	N/A	Demonstrated assembled windows and power measurements of 82W and Wpp = 53W in TIPD's Oceanside, CA facility	6	September 2015
Demonstrate 1m2 window with > 75W/m2 (Wpp > 50W/m2) in testing facility	Med	Assembled windows and power measurements in operational environment. Performance data in format to be shared with potential commercialization partners	7	September 2016

## HOW

**Projected Business Model:** TIPD's strategy would be to license the waveguide technology, patents and trade secrets to a large number of architectural design, window, and PV manufactures to speed the adoption in the market place. TIPD will use the proceeds from the licensing revenue to continue the research and development efforts on additional markets including automotive integrated PV and portable PV applications.

**Company Objectives:** Meet primes involved in construction of new buildings or remodeling existing buildings. Identify potential opportunities and confirm insertion points in procurement cycle. Confirm DoD road map to meet alternative energy requirements. Reconfirm windows specifications and identify other possible opportunities. Validate the approximately the conclusions from the approximately 6 months of field test data.

**Potential Commercial Applications:** TIPD's target is a transparent solar window submarket of the larger Building Integrated Photovoltaic (BIPV) market. The BIPV market is currently a small fraction of the more than \$48B solar market. It is forecast that the BIPV glass market in the US will grow from \$823 million (\$US) in 2014 to \$2.7 billion in 2019 representing a 27% compound annual growth rate. TIPD's solar window provide a competitive advantage by providing increased transparency in the visible portion of the spectrum compared to existing products.

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