

PMC-ND

(1.08.09.13)

**U.S. DEPARTMENT OF ENERGY  
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY  
NEPA DETERMINATION**



RECIPIENT: Boston University

STATE: MA

**PROJECT TITLE** Enhancement of Optical Efficiency of CSP Mirrors and Receivers with Reduced O&M Cost via Near-Continuous Operation of Self-Cleaning Electrodynamic Screens

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
FOA 0001186	DE-EE0007119	GFO-0007119-001	GO7119

**Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), I have made the following determination:**

**CX, EA, EIS APPENDIX AND NUMBER:**

## Description:

- A9 Information gathering, analysis, and dissemination** Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to this subpart.)
- B3.6 Small-scale research and development, laboratory operations, and pilot projects** Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.
- B3.11 Outdoor tests and experiments on materials and equipment components** Outdoor tests and experiments for the development, quality assurance, or reliability of materials and equipment (including, but not limited to, weapon system components) under controlled conditions. Covered actions include, but are not limited to, burn tests (such as tests of electric cable fire resistance or the combustion characteristics of fuels), impact tests (such as pneumatic ejector tests using earthen embankments or concrete slabs designated and routinely used for that purpose), or drop, puncture, water-immersion, or thermal tests. Covered actions would not involve source, special nuclear, or byproduct materials, except encapsulated sources manufactured to applicable standards that contain source, special nuclear, or byproduct materials may be used for nondestructive actions such as detector/sensor development and testing and first responder field training.

## Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Boston University to develop self-cleaning solar mirrors and solar panels with the application of transparent, electrodynamic screen (EDS) for near-continuous dust removal from solar collector surfaces.

Proposed activities would include the design, development, fabrication and field testing of self-cleaning solar mirrors and panels. Design and development would take place at the Photonics Center on campus at Boston University in Boston, MA. Fabrication of EDS films would be undertaken by Corning, Inc. from their industrial facility in Corning, NY in collaboration with the Industrial Technology Research Institute in Chung, Hsinchu, Taiwan. Optical modeling and field testing would be completed by Sandia National Lab (SNL) at their solar thermal test site in Albuquerque, NM. Further field testing would be conducted at NRG Energy's Ivanpah solar plant and Geodril's Atacama solar plant in the Atacama Desert in Chile. These facilities are purpose-built for the type of activities being proposed; therefore, no adverse impacts to sensitive resources are expected as a result of the proposed project. No new construction or ground disturbance would be required. No change in the use, mission or operation of existing facilities would arise out of this effort. The facilities already have all applicable permits in place.

Field testing would be carried out at SNL's solar thermal test site in Albuquerque, NM, NRG Energy's Ivanpah Solar Electric Generating System in the California Mojave Desert and Geodril's Atacama-1 solar plant in the Atacama Desert in Chile. The solar thermal test site at SNL is an existing test facility designed for the development and testing

of advanced solar thermal systems and Ivanpah and Atacama-1 are existing, concentrated solar thermal, power tower plants employing heliostats. The EDS film would be tested at these facilities to validate self-cleaning function of heliostat mirrors in both lab and pilot-scales by placing five EDS mirrors side by side with five mirrors without EDS. Each week a determination would be made regarding the reflectivity of the EDS mirrors in comparison to the reflectivity of the non-EDS mirrors. The prototype solar mirrors and/or solar panels would be tested in two phases: First year testing would involve testing 12.5 cm x 12.5 cm lab-scale mirrors and panels and second year testing would involve 50 cm x 50 cm mirrors and/or panels.

The proposed project would not involve any hazardous materials, processes or use of equipment that may cause health and safety hazards. The materials involved would be limited to glass mirrors, electrodes, thin glass films, optically clear adhesives, small battery-operated power supplies (each with a capacity less than 1W), and packing materials for shipping. All waste would be disposed of in the laboratories' standard solid waste treatment facility in accordance with local, state, and federal environmental regulations. No siting, construction or major expansion of waste storage, disposal, recovery, or treatment actions/facilities would be required. For all work conducted at DOE laboratories, project activities may be subject to additional NEPA review by the cognizant NEPA Compliance Officer for the lab and will be required to meet the labs health and safety requirements.

Based on review of the project information and the above analysis, DOE has determined the proposed project would not have a significant individual or cumulative impact to human health and/or environment. DOE has determined that this project is consistent with actions outlined in DOE categorical exclusions A9 "Information gathering, analysis, and dissemination", B3.6 "Small-scale research and development, laboratory operations, and pilot projects", and B3.11 "Outdoor tests and experiments on materials and equipment components" and is therefore categorically excluded from further NEPA review. The proposed activities at Geodrill's Atacama-1 solar plant in the Atacama Desert in Chile are exempt from further review under Executive Order (EO) 12114 per Section 5.1.1 (Actions not having a significant effect on the environment outside the US) of the DOE EO 12114 Implementing Guidelines.

#### NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

If you intend to make changes to the scope or objective of your project you are required to contact the Project Officer identified in Block 11 of the Notice of Financial Assistance Award before proceeding. You must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved.

Insert the following language in the award:

You are required to:

For all work conducted at DOE laboratories, the proposed project activities may be subject to additional NEPA review by the cognizant NEPA Compliance Officer prior to initiating those activities and will be required to meet the labs health and safety requirements.

Note to Specialist :

Solar Energy Technology Office  
This NEPA determination requires a tailored NEPA provision.  
Review completed by Rebecca McCord 09/9/2015

#### SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:



Electronically Signed By: Kristin Kerwin

NEPA Compliance Officer

Date: 9/18/2015

#### FIELD OFFICE MANAGER DETERMINATION

Field Office Manager review required

#### NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:

Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.