PMC-EF2a
(2.04.02)

U.S. DEPARTMENT OF ENERGY
EERE PROJECT MANAGEMENT CENTER
NEPA DETERMINATION

RECIPIENT: Stion Corporation **STATE:** CA

PROJECT TITLE : Stion Corporation - Superstrate Device for High Efficiency Tandem Modules; NREL Tracking No. 11-024

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
		NREL-11-024	GO10337

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:

B3.6 Siting, construction (or modification), operation, and decommissioning of facilities for indoor bench-scale research projects and conventional laboratory operations (for example, preparation of chemical standards and sample analysis); small-scale research and development projects; and small-scale pilot projects (generally less than two years) conducted to verify a concept before demonstration actions. Construction (or modification) will be within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible).

A9 Information gathering (including, but not limited to, literature surveys, inventories, audits), data analysis (including computer modeling), document preparation (such as conceptual design or feasibility studies, analytical energy supply and demand studies), and dissemination (including, but not limited to, document mailings, publication, and distribution; and classroom training and informational programs), but not including site characterization or environmental monitoring.

A11 Technical advice and planning assistance to international, national, state, and local organizations.

Rational for determination:

The Photovoltaic (PV) Technology Incubator project represents a significant component of the U.S. Department of Energy (DOE) business strategy of partnering with U.S. industry to accelerate the commercialization of photovoltaic system research and development (R&D) to meet aggressive cost and installed capacity goals. This specific partnership leverages technical capabilities and resources within the National Renewable Energy Lab (NREL) and other DOE laboratories/facilities to enhance and support areas of expertise within a small business in order to accelerate the development of the small business's technology. This early-stage assistance in crossing the technological barriers to commercialization also provides a better level of understanding and development on which the investment community can base decisions. Additionally, it would have multiple benefits for the country including reaching cost parity with baseload energy rates, increasing solar PV market share, boosting domestic solar manufacturing, and reducing greenhouse gas emissions.

The proposed subcontract would be for work in the 12-month PV Technology Incubator. The Subcontractor, Stion Corporation (Stion) would develop a technology that would significantly increase the efficiency of thin film solar photovoltaics. The subcontractor's technology uses thin-film design featuring two stacked devices that enables broader and more effective harvesting of available light. At the completion of this PV Incubator project, the subcontractor would be positioned to scale the technology to full size thin film production modules. At 15% efficiency, the copper-indium-gallium-sulfur (CIGS) or aluminum-copper-indium-gallium-sulfur (ACIGS) superstrate thin film module could compete on both a cost and efficiency basis with the majority of crystalline silicon PV modules. Silver (Ag) may also be added to the absorber layer to increase the bandgap up to 1.65 eV.

Work would be conducted in seven tasks over the 12 month period:
• Task 1 – Demonstration of Superstrate Device Performance, including the fabrication of Superstrate, Bifacial, Integrated Module
• Task 2 – Demonstration of Superstrate Device Performance, including optimization of absorber layer bandgap, design of experiments for improving absorber layer quality, module fabrication, and transparent conducting oxide (TCO) processing for optimal transmission and resistance
• Task 3 – Down-selection of TCO for Transmission and Resistance
• Task 4 – Development of Temperature and Chemical Tolerant TCO and Emitter
• Task 5 – Demonstration of Superstrate Device Performance
• Task 6 – Continued Demonstration of Superstrate Device Performance, using multiple period precursors
• Task 7 - Demonstration of Superstrate Device Performance and Cost Model for Thin Film Tandem Modules

The project goals would be achieved through the development of a superstrate device that would enable high efficiency tandem modules. The superstrate device would be fabricated with standard thin film deposition systems

such as magnetron sputtering, chemical bath deposition, reactive annealing, and MOCVD and through the use of standard methods and procedures associated with this equipment.

Proposed activities would be done at Stion's existing facility located at 6321 San Ignacio Blvd., in San Jose, California. Current operations are within a portion of one (1) building on a twenty-five (25) acre campus. The location is in an industrial park next to freeways and other industrial buildings. The proposed project would also require some interior modifications and exterior additions to the existing building. Interior modifications would include the installation of facilities support equipment to slightly expand the current capacity, such as electrical equipment, inert gas tanks for nitrogen and argon, and HVAC equipment. There would be no asbestos abatement activities associated with these modifications. External modifications would include the addition of a 300 sq. ft. service yard/equipment pad. All work would be completed using industry standard methods and protocols, and in accordance with all federal, state, and local regulations. Work is expected to occur from mid 2011 through mid 2012.

Stion currently has written Standard Operating Procedures regarding chemical use and storage, and these procedures would also apply to proposed project activities. Gas cylinders are appropriately stored in toxic gas storage cabinets. Bulk chemical containers received at the facility are typically received in small volumes (5 gal or less), and are placed in storage by trained on-site staff. Spill control and secondary containment are designed into all chemical storage locations and dispensing operations. All chemical storage and use would be in compliance with the applicable Fire Codes, CALOSHA Requirements and the CA Department of Toxic Substance Control Regulations. Employees are properly trained in the use and management of chemicals, injury prevention, and emergency response. The lab is equipped with proper safety equipment, including but not limited to fume hoods, emergency showers and eyewashes, PPE, gas leak detectors, fire alarm and suppression system, as well as an integrated Life Safety management system.

Stion currently uses air emissions abatement technology to reduce hazardous emissions to negligible discharge concentrations, and therefore, proposed operations would not have any significant effect on the local ambient air quality. Details regarding potential emissions and abatement technology are provided in the R&D Laboratories Questionnaire (uploaded to the PMC database).

Mixed industrial wastewater generated onsite as process wastewater and from water scrubbers is currently processed through an onsite wastewater treatment system. This onsite system has the ability to neutralize pH, selectively absorb toxic metal ions, and discharge treated industrial wastewater to the sanitary sewer in accordance with the San Jose Pollution Control Plant's regulations. Wastewater from the proposed project would be treated via the current facility wastewater systems.

Hazardous waste generated onsite would consist primarily of spent ion exchange resin (cadmium) that is shipped offsite for resin regeneration and cadmium recovery. Other hazardous wastes could include cadmium ammonium hydroxide solution, potassium cyanide solution, potassium hydroxide with selenium; corrosive liquids, solvents, and used oil. These wastes would be shipped offsite by a licensed waste hauler to a certified recycling center or permitted treatment facility. Stion's hazardous waste disposal vendor is Phillip Services Corporation.

A list of permits currently held by Stion (including hazardous waste, hazardous materials, industrial wastewater and air permits) and that would also apply to proposed project activities, is included in the R&D Laboratories Questionnaire (uploaded to this database). No changes or modifications to existing permits or the acquisition of new permits would be required by this proposed project. Any subcontractors involved in interior modifications and exterior additions would operate under Stion's written Contractor Safety Program, and construction permits have already been obtained from the City of San Jose.

Given the nature of this proposed action and its setting in an industrial park, it is not anticipated that this action would result in any impact to prime farmlands, wetlands, endangered species, or floodplains. Although work would be done in a Coastal Zone state, the proposed activities do not require a Coastal Zone Consistency Determination.

This proposed project would result minimal increases of hazardous waste generation, hazardous material utilization, and de minimis air emissions. Based on the information above, this proposed action would qualify for Categorical Exclusions A9, A11, and B3.6.

NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

Note to Specialist :

EF2a prepared by Rob Smith on 05/24/2011.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Lori Plummer /Lori Plummer/ Date: 5/25/2011
NEPA Compliance Officer

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.
☐ Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: _____
Field Office Manager