PMC-EF2a

(2.06.02)

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

RECIPIENT: NREL

STATE: CO

PROJECT TITLE : Solar TAC - Thermal Energy Storage Test Facility; NREL Tracking No. 11-016

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
		NREL-11-016	GO28308

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:

B1.15 Siting, construction (or modification), and operation of support buildings and support structures (including, but not limited to, trailers and prefabricated buildings) within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible). Covered support buildings and structures include those for office purposes; parking; cafeteria services; education and training; visitor reception; computer and data processing services; employee health services or recreation activities; routine maintenance activities; storage of supplies and equipment for administrative services and routine maintenance activities; security (including security posts); fire protection; and similar support purposes, but excluding facilities for waste storage activities, except as provided in other parts of this appendix.

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:

This project would establish a facility for evaluating the performance of pilot-scale advanced thermal energy storage (TES) systems. This project would begin construction in May-June 2011 using ARRA funds. The project would take place at the Solar Technology Acceleration Center (SolarTAC) located near Denver International Airport at Aurora Energy Campus which is northeast of the intersection of East 26th Avenue and North Hudson Road. SolarTAC is an existing 76-acre privately funded demonstration and test site for solar technologies operated by Midwest Research Institute (MRI), owned by the City of Aurora, Colorado, and serves several founding organizations including NREL.

Being able to test advanced TES systems for CSP at scale is essential to commercially developing and deploying these new concepts. The proposed pilot-scale TES facility would provide a general-purpose test bed available specifically to support DOE laboratory and industry test and evaluation activities. NREL would use these funds to complete a detailed design of the TES test and evaluation facility, followed by site preparation, equipment purchases, and installation. The facility would support testing of advanced TES concepts including sensible heat (e.g., salt, thermocline, concrete) and latent heat (e.g., phase-change) designs.

The proposed pilot-scale TES test facility would be constructed on a 5.10 acre leased-parcel at SolarTAC. This would leverage existing infrastructure that is either under construction or proposed for development at the SolarTAC. This infrastructure includes utilities, roads, and an assembly building, as well as one or more parabolic trough loops (2.5MW,t capacity each) owned by Abengoa Solar. Only a small portion of the 5.10 acre NREL site would be used for this project. The grades for the campus have already been cut and drainage facilities constructed in accordance with the approved Report and accompanying Plans. This has included site grading, drainage ditching, and revegetation. Therefore, minimal site grading is proposed for the new development. No federal funds were used to conduct the site preparation work. The new facility would conform within the drainage patterns and ground covers assumed in the overall campus design. The drainage pattern for the developed area would not be disturbed and would continue as overland flow to the drainage ditch to the west, which continues north to a detention facility.

The pilot-scale TES test facility has been designed to provide up to 2.5 MW of thermal input to a thermal storage system of storage capacity up to 10 MWh,t. To maximize operational flexibility, the thermal input would be delivered by a fossil-fired oil heater for storage systems charged by conventional oil-based heat transfer fluids (HTFs) (e.g.,

parabolic trough systems) and by a fossil-fired steam boiler for storage systems charged using steam-based HTFs (e.g., trough, linear Fresnel, and central-receiver systems). A third option using solar input would be available by connecting to a parabolic trough loop at the site. This loop would be fabricated by Abengoa Solar as part of an existing contract with DOE. Abengoa would benefit from close access to the facility and has agreed to provide NREL access to thermal output from the loop—2.5 MW at design conditions. The facility has been designed so that the storage system would discharge its thermal energy to a turbine generator. By doing so, NREL could investigate storage/turbine interactions. Heat rejection from the storage system would also be accommodated through air-cooled heat exchangers (oil HTF) or air-cooled condensers (steam HTF). This facility provides a general use TES pilot-scale demonstration capability not available in the United States.

Major equipment associated with the pilot-scale TES test facility would include the following:
• 2.5-MW fossil-fired oil heater – provides thermal input for charging TES systems using oil as the heat transfer fluid.
• 2.5-MW fossil-fired steam boiler – provides thermal input for charging TES systems using steam as the heat transfer fluid.
• Air/oil and air/steam heat exchangers – provides thermal input from discharge of TES systems to air turbine.
• 2.5-MW air-cooled heat exchanger – dissipates all or a portion of the energy from oil-charged TES systems.
• 2.5-MW air-cooled condenser – dissipates all or a portion of the energy from steam-charged TES systems.
• Open-air Brayton-cycle turbine – converts thermal energy from discharge of TES systems to electrical power. An air turbine is selected to minimize operating complexity and cost for the pilot facility, while providing a synchronous generator for integration with the TES system.
• Miscellaneous fluid flow, electrical, controls, and civil/structural equipment.

The infrastructure that would be added to this site would include an access road (approximately 316' X 18"); a crane pad (66' X 66') composed of compacted gravel; and four concrete pads (2 at 26' X 32' each; 1 at 18' X 22; and 1 at 20' X 14'). See attached Site Plan in the PMC. These pads would be used to contain a 10' X 12' data shed, support electrical equipment, house a HTF heating module, and a steam generation module. Also included would be a fuel tank with a secondary containment area (approximately 6' X 8'). The total area needed for this phase of the project is approximately 12,432 sq ft (0.29 acres). Once the equipment was installed, the crane pad would be transformed into a 30' by 45' test cell pad. A later phase of the project would include additional gravel pads for test cells, a turbine pad, an extension of the access road, and an expansion of the crane pad. This additional area would be approximately 2,400 sq ft (0.05 acres). The entire site would be enclosed by a 6' chain-link fence. The access road would have a gate (20' double swing).

If the proposed project would disturb more than 1.0 acre during construction, NREL (or its construction contractor) would obtain permit coverage under the Colorado Discharge Permit System General Permit for Stormwater Discharges Associated with Construction Activity (COR-030000). A stormwater management plan would be developed and implemented prior to construction and NREL staff would oversee project activities. Three Air Pollutant Emission Notices (APENs) would be obtained from Colorado Department of Public Health and Environment (CDPHE) Air Quality Control Division. Additionally, a Colorado Department of Labor and Employment (CDLE) Division of Oils and Public Safety aboveground storage tank permit would be required for the 2,500-gallon diesel storage tank. It is also anticipated that this facility would be required to develop a Spill Prevention Control and Countermeasures (SPCC) plan in accordance with US EPA requirements (40 CFR 112).

Chemicals brought on site needed during construction and for research would comply with site policies dictated by MRI and SolarTAC management. When NREL EHS policies are more stringent, they would be followed. Diesel fuel would be used to fire heaters and for power electricity when provided electrical power is down. The fuel would be stored in a 2,500-gallon, double-walled tank with secondary containment. Water condensate from steam generation system would be collected and transported offsite for disposal. Typically, this water would be disposed of in the sanitary sewer, but the SolarTAC site lacks a sanitary sewer. With this in mind, NREL would supply Port-a-let Toilets for workers and researchers. A silicone heat transfer fluid (HTF) would be used in the proposed HTF Heating Modules. The MSDS for this chemical compound is attached. The acute exposure risks to human health and the environment are low. However, buildings and systems with this chemical would have secondary containment. All SolarTAC policies and procedures would be followed. Consideration to NREL policies and procedures would be included especially when NREL requirements are more stringent.

It anticipated that this proposed action would not result in any impacts to endangered species, critical habitats, floodplains, prime farmlands, or wetlands. This proposed project would result minimal increases point-source air pollutants. Based on the information above, this proposed action would qualify for Categorical Exclusions A9, A11, B1.15, 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.
EF2a updated by Amy Vandercook on 7/2/2012.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Lori Gray / Lori Gray Date: 7/3/2012
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