

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Missouri S&T**STATE:** MO**PROJECT TITLE:** Grid-Interactive Steelmaking with Hydrogen (GISH)

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
DE-FOA-0002229	DE-EE0009250	GFO-0009250-001	

**Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), 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.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to Missouri S&T (MS&T) to develop a steel production system, combining a direct hydrogen reduction furnace for ironmaking (H2DR) with electric melting for steelmaking. The project would seek to develop the system to produce ferrous products (i.e. direct reduced iron (DRI) and hot briquetted iron (HBI)) at a high energy efficiency. The project would be completed over three Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP.

The steel production system would be developed and demonstrated at three different scales: 1) laboratory scale, 2) pilot scale, and 3) commercial scale. Each will be discussed below.

Laboratory scale research would consist of computer modeling and physical research focused on direct reduction and melting processes. MS&T would perform DRI melting and iron ore pellet reduction experiments utilizing an existing plasma arc furnace and associated equipment at its foundry and ceramic processing laboratory facilities at its campus in Rolla, MO. Project partner Arizona State University (ASU) would perform material characterization and reduction studies at laboratory facilities at its campus in Tempe, AZ. A laboratory-scale furnace would be installed at ASU, which would be utilized for the project. The furnace would be integrated into existing vents and electrical connections. The laboratory space in which the furnace would be installed is equipped with a proper gas ventilation system and fume hoods. No facility modifications would be required for installation of the furnace.

Pilot scale research would consist of the installation and operation of a direct reduction furnace at the research facility of project partner Hazen Labs, located in Golden, CO. The pilot-scale furnace would consist of various industrial components, including a reactor/furnace, a feed system, gas-feed and off gas systems, a solids discharge system, instrumentation, and auxiliary systems. The furnace would be integrated into existing facility infrastructure (e.g. ventilation and electric systems). The integrated furnace would have a diameter of approximately 0.2 m and height of approximately 0.8 m. It would produce approximately 5 tons of DRI over the course of the project. A support structure would also be assembled to secure the furnace in place. Various pieces of auxiliary equipment would also be installed. No facility modifications would be required for any of these installations.

Commercial scale research would be performed at the steelmaking production facilities of either Steel Dynamics (Columbus, MS) or Nucor Corporation (Crawfordsville, IN). An existing electric arc furnace (EAF) would be used to conduct DRI/HBI melting trials. Both Steel Dynamic and Nucor Corporation routinely use EAFs and associated

equipment as part of their regular course of business.

Project work would involve the use and handling of heavy machinery operating at high temperatures and compressed gases. All such handling would occur in controlled laboratory and manufacturing environments that are purpose built for the activities in question. Established corporate health and safety policies and procedures would be adhered to in order to mitigate potential risks. Project site locations would be equipped with appropriate safety systems. MS&T and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations.

## NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Fuel Cell Technologies Office

This NEPA Determination does not require a tailored NEPA Provision.

NEPA review completed by Jonathan Hartman, 12/30/2020

## FOR CATEGORICAL EXCLUSION DETERMINATIONS

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.

The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

The proposed action is categorically excluded from further NEPA review.

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

NEPA Compliance Officer Signature: \_\_\_\_\_

 Electronically  
Signed By: **Casey Strickland**  
NEPA Compliance Officer

Date: 1/6/2021

## FIELD OFFICE MANAGER DETERMINATION

- Field Office Manager review not required  
 Field Office Manager review required

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

Field Office Manager's Signature: \_\_\_\_\_

Field Office Manager

Date: \_\_\_\_\_