

**FINDING OF NO SIGNIFICANT IMPACT  
FOR  
SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT OF THE UNIVERSITY OF  
KENTUCKY, SMALL-SCALE PILOT PLANT FOR THE GASIFICATION OF COAL  
AND COAL-BIOMASS BLENDS AND CONVERSION OF DERIVED SYNGAS TO  
LIQUID FUELS VIA FISCHER-TROPSCH SYNTHESIS, LEXINGTON, KENTUCKY**

**RESPONSIBLE AGENCY:** U.S. Department of Energy (DOE), National Energy Technology Laboratory (NETL)

**ACTION:** Finding of No Significant Impact (FONSI)

**SUMMARY:** Pursuant to the Council on Environmental Quality (CEQ) Regulations (40 CFR Parts 1500-1508) for implementing the procedural provisions of the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et seq.*) and DOE's NEPA implementing regulations (10 CFR 1021), DOE prepared a Supplemental Environmental Assessment (SEA) (DOE/EA-1642S) of the potential environmental and socioeconomic effects associated with the completion of the design, construction, and operation of a small-scale pilot plant for research related to the gasification of coal and coal-biomass blends and conversion of derived syngas to liquid fuels via Fischer-Tropsch (FT) synthesis. This SEA identifies, documents, and evaluates the potential environmental effects of implementing the proposed action to be located at and operated by the University of Kentucky (UK) Center for Applied Energy Research (CAER) north of Lexington, Kentucky.

All discussions and findings related to the proposed action and the no action alternatives are presented in the attached Final SEA and Appendices. The Final SEA is hereby incorporated by reference.

Based on the analysis in the SEA, DOE finds that implementing the proposed action at UK CAER would not constitute a major Federal action that would significantly affect the quality of the human environment, within the meaning of NEPA. Therefore, the preparation of an Environmental Impact Statement is not required, and DOE is issuing this FONSI.

**BACKGROUND:** Previously, under the terms of a different cooperative agreement, DOE provided funding for the project in support of planning, preliminary design, and construction of a new Early Lead Mini FT facility, including a Process Development Unit (PDU) building to house the small-scale pilot plant. To support DOE's decision to grant the previous amount of co-funding, UK and DOE prepared and issued an Environmental Assessment (EA) and FONSI in 2009 and a Supplemental Analysis in 2010. Based on continued project planning and design work under a new cooperative agreement, UK and DOE amended the existing EA to cover changes to the upstream gasification and acid gas cleanup components of the facility. The proposed components would be housed in the existing PDU building located at UK's CAER near Lexington, Kentucky.

**PURPOSE AND NEED:** The current design, which is the topic of this SEA, would involve the redesigned "upstream" equipment and processes to produce syngas onsite from coal and coal-biomass blends to replace the natural gas component of the original design. The design would replace the steam methane reformer (proposed in the original EA) with a small coal-fueled gasifier and acid gas cleanup system. The change to coal gasification and acid gas cleanup technologies was made at the request of DOE, so as to provide true/real syngas from coal and true/real coal-derived liquids and fuels for research and development purposes. The interest is in bringing these technologies to maturation, as opposed to relatively proven natural gas reforming/methanation processes.

**DESCRIPTION OF THE PROPOSED ACTION:** DOE's proposed action is to provide an additional \$1.3 million in co-funding from NETL's Coal and Coal-Biomass to Liquids and Gasification Systems Programs (under DOE's Coal Program) to pay for additional equipment and further design work. The funding from DOE would advance the construction and establishment of a small-scale pilot plant for the gasification of coal and coal-biomass blends and conversion of derived syngas to liquid fuels via FT synthesis. This proposed project is intended to evaluate the commercial and technical viability of advanced technologies for the production of FT transportation fuels and other transportation fuels from domestic coal.

The proposed action for this SEA encompasses the design, construction, and operation of the "upstream" components of the FT PDU Facility, specifically, the coal handling, gasification, and acid gas cleanup components. The proposed project would involve the construction of concrete pads, associated equipment platforms, and installation of coal handling, gasification, and acid gas cleanup equipment at the existing PDU building, and operation of the FT PDU Facility at UK CAER.

The FT PDU Facility would produce research quantities (approximately 8 barrels per run) of FT liquids and finished fuels for subsequent testing at other universities. It would also provide open-access facilities and information in the public domain that would aid the wider scientific and industrial community in testing and evaluating the commercial viability of FT technology. A primary objective of the research conducted on fuels produced by the FT PDU Facility would be to evaluate environmental considerations, such as how to manage and reduce carbon dioxide emissions from coal-to-liquid facilities and from the use of such fuels.

**ALTERNATIVES CONSIDERED:** In addition to the Proposed Action, DOE considered the no-action alternative as required under NEPA. Under the no action alternative, DOE would not

provide funding for the proposed action. For the purposes of this SEA, it is assumed that the no action alternative means the upstream process for gasification of coal and coal-biomass blends would not be constructed nor operated at CAER, and thus there would be no impacts to the human or natural environment. If DOE funding is not provided, it is possible that funding would be secured from non-federal sources and proceed with the project either as currently planned or with some reduction in scope. Project cancellation would mean that the dedicated research facility would not be available to provide the desired research results that would accelerate the development of coal-biomass to liquids fuels for transportation and the deployment of infrastructure to make these fuels.

**ENVIRONMENTAL CONSEQUENCES:** The Final SEA examined the potential effects of the proposed action and no action alternative on 13 resource areas of environmental and socioeconomic concern, including: air quality/greenhouse gases, aesthetics, biological resources, community services, cultural resources, geography/topography/soils, human health and safety, materials and waste management, land use, noise, socioeconomics, transportation/parking, and water resources. Nine of the resource areas were screened from further analysis since the anticipated impacts is generally bounded by the impacts reported in the previous NEPA documents. Four sections, representing potential impacts from the proposed design changes, were analyzed in more detail, including air quality and greenhouse gases, water resources, human health and safety, and materials and waste management. The SEA also considered cumulative impacts that might reasonably occur as a result of the proposed action.

Based on the analysis contained in the Final SEA, DOE determined that the construction and operation of the proposed gasification of coal and coal-biomass blends and conversion of derived syngas to liquid fuels via FT synthesis, under the proposed action, would not have significant



adverse impacts, either individually or cumulatively, on the physical, biological, or human environments. Implementation of the proposed action would result in short-term and long-term minor impacts and potential long-term beneficial effects, which are described in the following paragraphs.

Minor impacts to air quality would be anticipated during construction and operation of the project. Construction would cause a temporary increase in emissions of criteria pollutants from construction equipment. Operation of the FT PDU Facility would result in a minor impact to air quality due to the estimated emissions of nitrogen and CO<sub>2</sub>, which would be new to the facility design from the proposed gasification and acid gas cleanup processes. These emissions for nitrogen would be below the Kentucky Division for Air Quality threshold for non-hazardous regulated air pollutants; however, operation of the PDU facility has the potential to cause the emissions of CO<sub>2</sub> for the entire CAER to exceed the non-hazardous regulated air pollutant threshold. Therefore, after consultation with both the UK Environmental Health and Safety (EHS) officials and personnel of the state air quality agency, CAER will likely require a new air quality permit separate from UK's Title V permit, and if required and considering future research purposes of the facility, will seek to permit the entire output/volume of the gasifier and downstream units.

Construction and operation of the proposed project is not anticipated to result in adverse impacts to water resources. Best management practices typical to small construction projects would be used to control the potential release of construction-related hazardous substances and wastes to nearby waters (i.e., surface water runoff, groundwater pollution). Operation of the proposed action would not result in discharges to local waterbodies. The product storage area would be paved and diked and include spill pallets to prevent accidental releases of product from reaching

adjacent surface waters. Other storage areas for coal drying, coal storage, waste storage, excess storage, etc. include similar spill prevention measures such as containment walls, concrete pads, diked areas, and spill pallets, as necessary. Operational activities would have negligible impacts on water demand and wastewater since the existing private utilities has adequate infrastructure. Potential occupational health and safety risks during construction are expected to be typical of risks for any other industrial/commercial construction sites. During construction, safety measures such as providing fencing around the construction site, establishing contained storage areas, and controlling the movement of construction equipment and personnel would reduce the potential for accidents to occur.

Operation of the FT PDU Facility would involve equipment and materials that have the potential to be hazardous, including liquid oxygen required for the gasification process, and removal of hydrogen sulfide ( $H_2S$ ) from the coal-derived syngas. A quantity of 1,500 gallons of liquid oxygen would be delivered by tanker truck once per run and stored in a cryogenic oxygen tank located on a concrete pad with spill protection. The tank would have leak monitors placed around the tank itself as well as inside the building where the oxygen enters the process, to make sure flammable oxygen is not leaking. If a release of  $H_2S$  would occur, it would occur within the facility building and be contained until the facility exhaust fans were activated. It is expected that exhausted gases from such a release would be quickly dispersed, mixed, and diluted in the atmosphere below harmful concentrations. Numerous safety features and related infrastructure would be incorporated into the FT PDU Facility to help prevent catastrophic health and safety consequences, including sensors, alarms, fans, automatic and manual shutdown protocols, etc.

Construction and operation of the upstream components of the FT PDU Facility would require the use of various materials, and would result in the generation of minor amounts of non-

hazardous wastes. Coal would be the process input required in the greatest amounts, and slag/ash would be the primary waste generated. The UK EHS, Environmental Management Department reviewed the anticipated waste streams associated with the proposed project and confirmed that UK CAER would remain in compliance and would have no effect on the facility's current hazardous waste generator status. Additionally, the amounts of waste generated from the upstream process units of the FT PDU Facility would not impact local and regional waste treatment and disposal capacity.

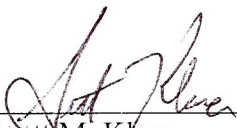
**PUBLIC AVAILABILITY:** DOE encourages public participation in the NEPA process. This SEA was released for public review and comment after publication in the *Lexington Herald-Leader* of the Notice of Availability. The public was invited to provide oral, written, or e-mail comments on the Draft SEA to DOE during the comment period, which occurred from December 18, 2013, through January 22, 2014. Copies of this Draft SEA were also distributed to cognizant agencies (i.e., the Kentucky e-Clearinghouse and the Kentucky Department for Environmental Protection) and were available for review on DOE's NETL website at: <http://www.netl.doe.gov/publications/others/nepa/ea.html>. Additionally, copies of the Draft EA were made available for review at the Lexington Public Library Northside Branch located at 1733 Russell Cave Road and also at the UK CAER main receptionist located at 2540 Research Park Drive. Comments were received from the Kentucky e-Clearinghouse and the Kentucky Department for Environmental Protection (see Appendix A3 and A4) and were considered during preparation of the Final SEA. No public comments were received.

Copies of the Final SEA and this FONSI are available at NETL's web site, listed above, or by sending a request to:

William J. Gwilliam  
U.S. Department of Energy  
National Energy Technology Laboratory  
3610 Collins Ferry Road  
P.O. Box 880  
Mailstop I07  
Morgantown, WV 26507-0880  
Email: [william.gwilliam@netl.doe.gov](mailto:william.gwilliam@netl.doe.gov)

**DETERMINATION:** Based on the information presented in the Final SEA (DOE/EA-1642S), and the previous NEPA analysis completed for the project, DOE finds that implementing the proposed action at UK CAER would not constitute a major Federal action that would significantly affect the quality of the human environment, within the meaning of NEPA. Therefore, the preparation of an Environmental Impact Statement is not required, and DOE is issuing this FONSI.

Issued in Pittsburgh, PA, this 28<sup>th</sup> day of February 2014.

  
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Scott M. Klara  
Acting Director  
National Energy Technology Laboratory