U.S. Department of Energy
Categorical Exclusion Determination Form

Program or Field Office: Advanced Research Projects Agency - Energy (ARPA-E)

Project Title: 25A4274 - Energy Efficient Capture of CO2 from Coal Flue Gas

Location: Illinois,

Proposed Action or Project Description: American Recovery and Reinvestment Act: ☒

The world needs to reduce greenhouse gas emissions while keeping energy costs affordable. Nalco Company and Argonne National Laboratory are developing a groundbreaking technology to dramatically decrease the costs to capture carbon dioxide from the coal-fired power plants. The need: Coal is abundant in the U.S. and coal-fired power plants produce about half of our electricity. As the economy grows and becomes increasing electrified for everything from data centers to plug-in hybrid vehicles, we expect demand for power to grow. Coal-fired power plants are also the single largest emitter of carbon dioxide, the most prevalent greenhouse gas. If we use existing technology, the cost to just capture the CO2 could double power costs to residential and business customers. The U.S. Department of Energy is actively seeking solutions to minimize the cost of capturing and sequestering CO2 to avoid the impact of climate change. Nalco and Argonne will develop and commercialize a system that could reduce this impact by up to half. If successful, green power will be much more affordable. Today's technologies use amines, chemicals that are very effective at capturing CO2. Unfortunately it takes a lot of energy to remove the CO2 from the amines so that the chemical can be reused. The solution: Nalco and Argonne are using a unique factor in the way CO2 dissolves in water. When water is a slightly alkaline, CO2 will readily dissolve in water. If we think of a soft drink or seltzer, the challenge is that the CO2 leaves the water slowly. Nalco and

Categorical Exclusion(s) Applied:

X - B3.6 Siting/construction/operation/decommissioning of facilities for bench-scale research, conventional laboratory operations, small-scale research and development and pilot projects

*-For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, see Subpart D of 10 CFR10 21 Click Here

This action would not: threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, including DOE and/or Executive Orders; require siting, construction, or major expansion of waste storage, disposal, recovery, or treatment facilities, but may include such categorically excluded facilities; disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; or adversely affect environmentally sensitive resources (including but not limited to those listed in paragraph B.(4)) of Appendix B to Subpart D of 10 CFR 1021). Furthermore, there are no extraordinary circumstances related to this action that may affect the significance of the environmental effects of the action; this action is not "connected" to other actions with potentially significant impacts, is not related to other proposed actions with cumulatively significant impacts, and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211.

Based on my review of information conveyed to me and in my possession (or attached) concerning the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: /s/ William J. Bierbower Digitally signed by William J. Bierbower DN: cn=William J. Bierbower, o, ou, email=william.bierbower@hq.doe.gov, c=US Date: 2009.12.18 10:19:52 -05'00' Date Determined: 12/18/2009

Comments: Webmaster:

alkaline, CO2 will readily dissolve in water. If we think of a soft drink or seltzer, the challenge is that the CO2 leaves the water slowly. Nalco and Argonne realized that if you make the water slightly acidic, the CO2 readily bubbles out of the water. Using an advanced technology called Resin-Wafer Electrodeionization (RW-EDI), Nalco and Argonne can use a small amount electricity to shift the water between alkaline and acid. This enables the system to first capture and then release CO2. To make the system work more efficiently, the team uses carbonic anhydrase, a natural enzyme that help living cells get rid of CO2. In this project, Nalco and Argonne will spend $3 Million, $2,250,000 of ARPA-E and $750,000 from Nalco to significantly enhance the performance of the RW-EDI system. An important function will be to evaluate whether the RW-EDI will operates continuously at pilot scales. Upon completion of the project, the team will evaluate whether the RW-EDI could work at a commercial scale. Part of the consideration will be based on whether the system can be integrated with a beneficial use for the CO2. Potential uses for the CO2 include growing algae to produce biofuels or making renewable plastics that replace petroleum-based plastics. Nalco Company is an Illinois-based company that trades on the New York Stock Exchange. It has over 11,000 employees and conducts business in 130 countries. Argonne National Laboratory, also based in Illinois, is DOE's first national laboratory. It is operated by the UChicago-Argonne LLC for DOE and has about 3,000 employees.