Project: Center for Zero Emissions Research & Technology

Brief Description: $10 million is requested to further develop the virtual research center for Zero Emissions Research & Technology headquartered at Montana State University (MSU) and involving multiple DOE national labs and research universities in heavy coal producing states to monitor and validate deep geological carbon dioxide sequestration and climate friendly coal utilization.

Executive Summary: Approximately one third of the anthropogenic carbon dioxide emissions worldwide are due to electrical power generation. New technologies hold great promise to significantly reduce these emissions from fossil fuels, but the engineering, economic, and environmental viability of these zero emission fossil energy technologies must be validated. Additionally, technologies are being investigated to address long term liability issues by accelerating trapping mechanisms. *For this reason, the Center for Zero Emissions Research and Technology (ZERT), an independent DOE sponsored research center focused on the advanced research aspects of geologic sequestration has been established.* This virtual center encompasses multiple DOE national laboratories and two research universities located in large coal producing states (one eastern and one western). ZERT is playing a critical role in basic research and engineering in support of the Carbon Sequestration Regional Partnerships and the overall carbon sequestration program.

Project Description: Major regulatory considerations in carbon capture and storage (CCS) are: (1) the liability generated by the stored CO2; (2) management of the associated risk; and (3) assignment and acceptance of the associated responsibility. Given that trapping mechanisms require centuries to effectively immobilize the majority of the emplaced CO2, the long term nature of this liability has strong regulatory, legal and technical ramifications. There is broad recognition that if the CO_2 plume becomes immobile and the seals have proven competent to that point, probability of leakage through formations is small. However, leakage through wells remains the primary risk because of the corrosive nature of dissolved CO2 on well casings and cement.

Given these issues, sites could be abandoned and responsibility transferred with lower risk and higher confidence (and greater insurability) if technologies existed that: (1) allowed operators to engineer the rate of trapping mechanisms so that long term stability is reached in decades to a century instead of centuries to a millennia; and (2) formations could be plugged outside the wellbore to prevent cement and casing degradation. ZERT is working on innovative new technologies to accelerate trapping mechanisms using microbial processes to address the long term liability issues. ZERT is also conducting fundamental studies on CO_2, brine, rock, and well material chemistry and developing technologies to measure wellbore integrity and to plug the formation outside the wellbore. In addition, ZERT is developing comprehensive risk assessment / management tools and computational tools to understand the CO_2 flow and chemical behavior in the subsurface.

Congressional Action Needed: Funding of $10 million dollars in FY11 is requested.

Importance to the Nation: The heavy U.S. reliance on foreign energy sources is an obvious national security issue. U.S. coal reserves are projected to be capable of providing more than 200 years of the nation's energy needs, but current technologies would result in this being a polluting and greenhouse gas producing energy source. The Center for Zero Emissions Research and Technology would help develop and validate zero emission technologies for energy production from fossil fuels. This would provide an economic benefit in coal and power producing states as well as the national security benefit.

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