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Overview of Carbon Capture and Sequestration: Current Status, Critical Gaps, and Recommendations for Deployment

by

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Refreshments — 3:15 pm — Room 401 Walter Digital Technology Center
Graduate Seminar — 3:30 pm — Room 402 — Walter Digital Technology Center

ABSTRACT — Carbon capture and storage (CCS, sometimes called carbon sequestration) has emerged as a key technology pathway to substantial greenhouse gas reductions. While not sufficient to total energy decarbonization, it appears able likely to contribute between from 10-50% of the potential abatement needed for stabilization of atmospheric CO2 at 560 ppm and provides an avenue for large-scale immediate action. The current primary pathways to capture and separation include post-combustion, pre-combustion, and oxyfiring methods, and each appears economically viable today in many settings. In capture technology, the primary research issue is cost reduction. Geological storage is accomplished through injection into three primary storage classes: saline formations, depleted oil and gas fields, and unmineable coal seams. In each, multiple trapping mechanisms prevent the return of CO2 to the surface. In storage technology, the primary issues are uncertainty and risk reduction, which is partly inherent in subsurface work.

To effectively reduce global GHG emissions, commerical CCS deployment is likely to require 1000's of large volume injection facilities distributed globally with very low percentages of leakage. This immediately raises questions of injection scale, which in turn prompts scientific and technical questions regarding capacity, storage mechanisms, site effectiveness, and potential risks to private and public stakeholders. Although several large-scale projects exist, they do not currently cover a wide enough range of geological conditions to demonstrate that this technology pathway is likely to succeed. Additional science and technology is required to develop the operational protocols needed to successfully deploy CCS at scale. This work can be conducted parallel to large and carefully executed early deployment.

BIO — Dr. S. Julio Friedmann received his B.S and M.S. degrees from M.I.T., followed by a Ph.D. from USC. After graduation, he worked for five years as a senior research scientist in Houston, first at Exxon and later ExxonMobil. He next worked as a research scientist at the U of Maryland, affiliated with the Joint Global Change Research Institute (JGCRI) at the U of Maryland, and the Colorado Energy Research Institute at Colorado School of Mines. In his new appointment as head of the Carbon Management Program for Lawrence Livermore National Laboratory, he leads initiatives and research into carbon capture, carbon storage, and fossil fuel recovery and utilization. In this role, he has submitted Congressional testimony for the US Senate and California Assembly, published in Foreign Affairs and the New York Times, and worked with the EPA, USGS, many private companies, and DOE. He was invited by MIT to join their team on the Future of Coal Energy Report and helped assemble the National Petroleum Council report on the future of oil and gas in the US. His research interests include carbon sequestration, underground coal gasification, hydrocarbon systems, deep-water depositional systems, basin & range tectonics and sedimentation, sequence stratigraphy, and landslide physics. A native of Rhode Island, he has worked in CA, WA, UT, WY, CO, Spain, Ireland, the North Sea, Nigeria, Angola, Venezuela, Azerbaijan, and Australia

No Informal Faculty Luncheon on Wednesday, March 21, 2007.