SAND2006-2836C

Geological Carbon Sequestration: A Performance and Economic Risk Analysis

Richard Klotz[1]
Hobart and William Smith Colleges

Peter H. Kobos
Sandia National Laboratories

Thomas E. Drennen
Sandia National Laboratories and Hobart and William Smith Colleges

26th USAEE/IAEE North American Conference
September 24-27, 2006, Ann Arbor, Michigan

There is growing interest surrounding the economic and performance risks associated with carbon sequestration technologies. Wide-scale carbon sequestration is one of several options that may reduce the amount of carbon dioxide (CO_2) emitted each year. Sequestration allows for the burning of fossil fuels to continue along a "business as usual" path, and provides a low cost method to help curb CO_2 emissions. However, like most technologies looking toward large-scale deployment, many issues regarding economic and performance risk remain to be characterized. The Carbon Sequestration and Risk (CSR) model has been developed to provide a high level, user-friendly approach to quantifying both the performance and economic risks of carbon sequestration and geologic storage.

Performance risk refers to whether carbon sequestration in leaky reservoirs will restrict atmospheric CO_2 to the levels suggested by the Intergovernmental Panel on Climate Change (IPCC). Whether these levels can be achieved is a function of projected fossil fuel consumption and likely leak rates. The risk lies in whether or not, on a global scale, enough CO_2 can be sequestered each year to offset both the emissions from fossil fuel consumption, and the leaks from sinks that store previously sequestered CO_2.

Economic risk will determine whether select carbon sequestration technologies can be deployed at an economically viable level and still meet the environmental goals of sequestration. Assuming that a system of global carbon trading is operational and that performance risk is acceptable, storage in leaky reservoirs would only happen if the net present value of storage in leaky reservoirs was similar to the net present value of storage in permanent reservoirs. To determine economic risk, assumptions need to be made about the discount rate and the price path of carbon.

By analyzing different scenarios and providing confidence intervals for the net present value forecasts of the CSR model, a policy maker or researcher is able to assess conditions under which carbon sequestration would be an economically effective strategy of addressing global CO_2 emissions.

---

[1] Primary author contact information: Richard Klotz, Department of Economics, Hobart and William Smith Colleges, Geneva, NY 14456, (315) 781-3185, klotz@hws.edu.