

Implications of Limiting CO₂ Concentrations for Land Use and Energy

Abstract

The first part of this presentation covers the types of scenarios and models used for analysis of energy and climate policy. Economic models used for analysis of climate impacts or alternative climate policies are continually evolving to better handle agriculture, forestry, biofuels, and the competition for land among these uses. The second part of the presentation describes a recent study that explores the link between climate policy and land use.

Limiting atmospheric carbon dioxide (CO₂) concentrations to low levels requires strategies to manage anthropogenic carbon emissions from terrestrial systems as well as fossil fuel and industrial sources. We explore the implications of fully integrating terrestrial systems and the energy system into a comprehensive mitigation regime that limits atmospheric CO₂ concentrations. We find that this comprehensive approach lowers the cost of meeting environmental goals but also carries with it profound implications for agriculture: Unmanaged ecosystems and forests expand, and food crop and livestock prices rise. Finally, we find that future improvement in food crop productivity directly affects land-use change emissions, making the technology for growing crops potentially important for limiting atmospheric CO₂ concentrations.

Background Papers

Sands, R., Brady, M., and M.-K. Kim. June 2009. "Survey of Land Representation in Economic and Biophysical Models," presented at the 12th annual Global Trade Analysis Project (GTAP) conference in Santiago, Chile.

Wise, M., K. Calvin, A. Thomson, L. Clarke, B. Bond-Lamberty, R. Sands, S. Smith, A. Janetos, and J. Edmonds. May 29, 2009. "Implications of Limiting CO₂ Concentrations for Land Use and Energy." *Science* 324: 1183-1186.

Bio Sketch

Ron Sands joined USDA's Economic Research Service (ERS) in January 2009. Ron's current role is to extend ERS modeling capabilities to include simulation of alternative policies to reduce net greenhouse gas emissions in agriculture and forestry. Prior to joining ERS, Ron had nearly 22 years of service with Pacific Northwest National Laboratory (PNNL) at various locations: Richland, Washington; Portland, Oregon; Washington, D.C.; and the Joint Global Change Research Institute in College Park, Maryland. Ron's research at PNNL included the development of economic models to simulate global land competition and energy systems in the context of a greenhouse gas mitigation policy. Ron received a Bachelor of Electrical Engineering degree and a Ph.D. in economics, both from the University of Minnesota.

Contact Information

Ronald D. Sands
Research Economist
USDA/ERS/RRED/PET
1800 M St. NW, Room S-4049
Washington, DC 20036

rsands@ers.usda.gov
+1 202-694-5535 (office phone)