UNST 124g spring 2011
get a grip

1 introduction

Anthropogenic missions of CO_2 and other "greenhouse gasses" have resulted in global warming and associated climate changes (IPCC, 2007). If we determine that the effects of ongoing warming are undesirable, then we—as a global community and as individuals—must develop and carry out strategies to limit future emissions. The planetary boundaries framework (Rockström et al., 2009) is one of several tools we can use to identify goals for tolerable atmospheric CO−2 concentrations. Meeting those goals requires changes in how we produce and use energy.

Robert Socolow and Stephen Pacala are professors at the Massachusetts Institute of Technology whose research approaches the carbon cycle in two different ways. Dr. Socolow, an engineer, specializes in energy efficiency and carbon emissions management. Dr. Pacala, an ecologist, studies interactions among Earth system components as they relate to the global carbon cycle. Together, they developed a straightforward scheme for comparing the effectiveness of various CO_2 mitigation strategies and evaluating the scale at which any strategy would be an effective means for reducing emissions at a global scale.

2 assignment

Read the *Scientific American* article (Socolow and Pacala, 2006) in which the carbon wedge concept is described and implemented.

1. Explain, in your own words, how the carbon wedge concept works and the types of changes it includes. What kinds of emission-reducing activities count and which do not count?
2. Socolow and Pacala write that all of the wedges they present are attainable, though some require more innovation than others. Select two wedges that you find particularly interesting and describe them.
3. Do Socolow and Pacala think market-based incentives are sufficient to drive the changes they presecribe?

4. Why does Socolow and Pacala's action plan include continued growth in CO_2 emissions from the developing world over the next 50 years? Is this reasonable?

3 references

IPCC. (2007). Climate Change 2007: Synthesis Report **Summary for Policymakers.** Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Core Writing Team, Pachauri, R.K and Reisinger, A. (Eds.). IPCC: Geneva, Switzerland. Retrieved from `http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf`

Rockström, J., and 29 others. (2009). A safe operating space for humanity. *Nature*, 461, 472-475.

Socolow, R. and S. Pacala. (2006). A plan to keep carbon in check. *Scientific American*.