

Final Exam Climate Solutions
Spring 2010

Name _____

Answer each of the following questions clearly, thoroughly, yet concisely.

1. (5 pts.) In one sentence, describe, in detail, how greenhouse gasses heat the planet.
2. (5 pts.) What is the *Keeling Curve*?
3. (5 pts.) What is a *positive feedback loop*? Give an example of a positive feedback loop in climate change.
4. (5 pts.) Atmospheric concentrations of CO₂ were about _____ ppm in 1957, and _____ ppm in 2009.
5. (5 pts.) Explain concisely what *energy return on energy investment (EROI)* is, and explain why this concept matter in the 21st century.

9. (10 pts.) What are *avoided capacity costs*? What steps might one take to encourage a reduction in an electric utility's **capacity** costs?
10. (10 pts.) What are *avoided capital costs*? What steps might one take to encourage a reduction in an electric utility's **capital** costs?
11. (10 pts.) John Michael Greer argues that three common responses of people upon hearing about peak oil concerns are (1) political action, (2) survivalism, and (3) lifeboat communities. What are his critiques of each one, and why does he find all three inadequate responses to peak oil?

12. (10 pts.) A researcher measures $\delta^{13}\text{C}$ in some organic sediment that is estimated to be 50 million years old. The ratio in this sedimentary layer is lower than in rock layers above it and below it. Explain **why** $\delta^{13}\text{C}$ is of significance, and explain **what** the researcher **can infer** from his finding the $\delta^{13}\text{C}$ ratio to be lower than in rock layers above and below the organic sedimentary layer.

13. (10 pts.) List ten (out of fifteen in the book) of the wedges of the *stabilization triangle* that each would reduce carbon emissions by one billion tons per year by 2050. Explain which might be the easiest to achieve.

14. (10 pts.) A climate warming skeptic correctly points out that the sun emits more energy now than it did three billion years ago, and argues that global warming is a result of the sun's emitting more energy over time, rather than greenhouse gasses. **Explain the evidence** that scientists, including your author Bloom, use to counter this argument and to assert that it is greenhouse gasses, rather than increased solar radiation, that is causing currently observed global warming.

15. (20 pts.) What actions have you already taken to reduce your personal greenhouse gas production? Explain the relative impact (which actions have the biggest impact) of each of your actions. Which action will you take from now on? Explain their relative impact.

16. (20 pts.) On page 305 of *The Upside of Down*, Homer-Dixon states: “The endless material growth of our economies is fundamentally inconsistent with these physical facts of life. Period. End of story. And a value system that makes endless growth the primary source of our social stability and spiritual well-being will destroy us.” What evidence does he use to support his viewpoint? How would you imagine that the three authors (Cleetus, Clemmer and Friedman) of the Union of Concerned Scientists’ book *Climate 2030: A National Blueprint for a Clean Energy Economy* might respond to Homer-Dixon’s assertion? Write a short position statement that the three authors might send to Homer-Dixon.