

# ENRG3310: Introduction to Energy and Sustainability

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## Midterm III

December 3, 2015

Name: \_\_\_\_\_

Last

First

Student ID Number: \_\_\_\_\_

Read directions very carefully. Write your answer legibly in the designated spaces. *Total number of points is 150.*

### KYOTO PROTOCOL

1. What was the primary method the Kyoto Protocol used to reduce global CO<sub>2</sub> emissions? *3 points*

2. The design of the Kyoto Protocol built on earlier environmental initiatives. What did each of the following air pollution policy issues from the past illustrate to the framers of the Kyoto Protocol? *4 points*

Ozone depletion in the 1970s and 1980s:

Acid rain in the 1980s and 1990s:

3. What is the purpose of the “Clean Growth Mechanism” in the Kyoto Protocol? *2 points*

How does it function?

*2 points*

### **Future Approaches to the Control of Greenhouse Gases (GHGs)**

4. Define these three approaches to the reduction of the impacts of GHGs and give one example of each. *3 points each*

Mitigation:

Adaptation:

Geoengineering:

5. What is the importance of 2 degrees centigrade in current debates about climate change? *3 points*

### **Energy Subsidies**

6. Define Renewable Portfolio Standards (RPS) and give one example. *2 points*
7. Define Feed-in-Tariffs and give one example. *2 points*
8. How has ethanol been subsidized in the US? *2 points*
9. What is the primary purpose of the FutureGen project? *2 points*

10. How has FutureGen 2.0 evolved during the Obama Administration? *3 points*

11. Has FutureGen been fully funded by government? *3 points*

**CAFÉ Standards**

12. What do the letters in CAFE stand for? *1 point*

13. What do CAFE standards measure for each auto company? *2 points*

14. How did the original (1975) CAFE standard encourage the growth of SUVs? *2 points*

What is the CAFE standard now set for passenger cars for 2016? \_\_\_\_\_ *1 point*

What is the projected CAFE standard for passenger cars for 2025? \_\_\_\_\_ *1 point*

15. Why is the 2025 version of CAFE standards seen as a departure in energy/environmental efficiency? *2 points*

16. Define the phrase rebound effect as it applies to CAFE standards. *2 points*

17. How will electric cars be counted in calculating CAFE standards for 2025? *2 points*

**Short Essay: Climate Change and the Future of Cars**

*25 points*

EVALUATE one of the following quotes: (Use the back of this page if needed.)

The Economist articles on the future of cars neglect the potential impacts of climate change on car designs. A realistic projection would more fully discuss how cars might change in response to global warming.

*or*

In the next twenty years the changes in car powertrains discussed in the Economist articles will greatly increase fuel competition in transportation markets, dramatically reducing the environmental impacts of automobiles.

Note: Use the material in the articles in your answer.

You can evaluate a quote by agreeing with it or disagreeing or both.



18. Brazil chose sugarcane as the biofuels crop of choice, while the US appeared to have chosen corn. List four key differences between these two potential sources of biofuels, and reflect on their contributions to energy balance. *4×4 = 16 points*

**#1**

**#2**

**#3**

**#4**

19. Solar energy is a growing source of environmentally friendly renewable energy, with no CO<sub>2</sub> emissions. However, it still has some undesirable societal and environmental effects. List three of these. *3×5 = 15 points*

**#1**

**#2**

**#3**

20. Provide brief definition of the following terms and explain how they may contribute to energy efficiency of a building:

*3×5 points = 15 points*

**dogtrot**

**thermal mass**

**solar water heating**

21. Write a couple of sentences about each of the following aspects of hydroelectric power.

*3×7 points = 21 points*

**Current importance in global energy mix and potential for future growth**

**Undesirable environmental consequences**

**Desirable environmental and societal aspects**

22. If a hydroelectric powerplant has a rated power of 6 GW, how many households can it power. Assume that an average household uses 900 kWh per month. *8 points*