ENRG3310: Introduction to Energy and Sustainability **Midterm II**

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Name: _____ Student ID Number: _____

Last First

Total number of points is 200.

COAL—*20 points*

1. According to the EIA, what are coal's long-term prospects in the U.S.? In the world?

4 points

List two key issues that will have to be solved before carbon capture and storage can be used to make coal a competitive fuel in a carbon-constrained world?

4 points

What has been the impact of the shale gas revolution on the key market for coal in the U.S.?

2 points

List one of the most significant weaknesses of coal that might limit its use as a major U.S. fuel in the next 25 years? Briefly justify your answer.

10 points

BONUS: Name the largest coal producing basin in the U.S.

EASY OIL—*20 points*

2. Define "easy oil".

2 points

According to Yergin, has the production of global oil peaked?

YES NO *2 points*

According to Deborah Gordon, which general category of fuel is most likely to replace easy oil if global markets alone shape energy use in the future?

2 points

Which three examples did the lecture use to illustrate important types of "broadening" of the production of easy or conventional oil?

3 points

(1)

(2)

(3)

Which region led the world in the production of easy oil from 1901 to the 1950s?

1 point

List one of the most significant weaknesses of easy oil that might limit its use as a major U.S. fuel in the next 25 years? Briefly justify your answer.

10 points

BONUS: What is the name of the largest developed oil field in the world?

UNCONVENTIONAL OIL—*20 points*

3. How do the analyses of Yergin and Gordon differ on the environmental impacts of oil sands?

2 points

Define "proved reserves" of oil.

2 points

Making use of Gordon's article, define unconventional oil?

3 points

List three factors cited in class lectures that shape the future of unconventional oil.

3 points

(1)

(2)

(3)

List one of the most significant weaknesses of unconventional oil that might limit its use as a major U.S. fuel in the next 25 years? Briefly justify your answer.

10 points

BONUS: What is the concluding argument in "The Key to Keystone"?

UNCONVENTIONAL NATURAL GAS—*20 points*

4. Who is generally regarded as the father of modern fracking? What role did government play?

2 points

What is the opinion of the author of "Bonanza" about the prospects for quick development of shale gas outside the U.S.?

2 points

List one of the most significant weaknesses of shale gas that might limit its use as a major U.S. fuel in the next 25 years? Briefly justify your answer.

6 points

In the past LNG prices generally have been closely tied to the price of which other fuel?

2 points

What does "Bonanza" predict as the "probable" way gas prices will be set in twenty years?

2 points

List one of the most significant weaknesses of LNG that might limit its use as a major U.S. fuel in the next 25 years? Briefly justify your answer.

6 points

BONUS: Which nation was the world's largest exporter of LNG in 2011?

FUTURE OF FOSSIL FUELS—*20 points*, if necessary, use the back of this page

5. Assume that climate change is miraculously solved tomorrow morning. Which fuel (coal, oil, or natural gas) do you think will be the dominant fossil fuel in U.S. markets in 2050? Why? Be sure to cite the most significant strengths of the fuel you choose. (Note: Include unconventional oil and gas in the general categories of oil and natural gas).

20 points

6. Describe, in as much detail as you can, how is nuclear energy produced: what is the fuel, how do we get energy out of it, how much do we need of the fuel, what are the health and environmental consequences of using this fuel and technology.

25 points

7. In 2000, China consumed 7 million barrels of oil per day, with the annual growth of 7.5%. The United States consumed about 21 million barrels per day, increasing by about 1.4% annually. If these rates hold, how long will it be before China overtakes the United States in oil consumption?

30 points

8. Succinctly define, in your own words, the following concepts:

4×5 points = 20 points

Critical Mass (in nuclear reactions)

Pumped Storage

Diesel Fuel

Kilowatt-hour (kWh)

9. What causes acid rains and what are their consequences? Be very specific in your answer: describe which fuels cause acid rain, how, what are the consequences of these rains, and how can their occurrence be minimized.

15 points

10. What causes nitrogen oxides (NOx) emissions and what are their consequences? Be very specific in your answer: describe which fuels cause NOx emissions, how and when, what are the consequences of these emissions, and how can they be minimized.

15 points