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

Prof. Ognjen Š. Miljanić April 27, 2017

Name: _____ Student ID Number: _____

Last First

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

1. How much uranium does a 500 MW nuclear power plant consume in a year? Assume the following: the plant operates at 80% of its capacity on average, 365 days a year; only 0.7% of natural uranium is actually fissile material (i.e. produces energy in a power plant); a single atom of uranium weighs 3.95×10^{-25} kg, and its decomposition in the nuclear reactor generates 30,000,000 aJ of energy. You will need to make your own assumption about the efficiency of the power plant. *30 points*

2. What is the installed wind capacity in Texas? If Texas was an independent country, how would it rank against other countries in the world? *20 points*

3. Estimate losses (in %) involved in transporting 780 MW of wind power from Roscoe to Fort Worth. *20 points*

4. Estimate carbon dioxide emissions, in kg, of a suburban home in Houston (located in e.g. Pearland). Assume a four-person, two-car family, and also assume that one of the adults works downtown and other locally. Then, estimate CO_2 emissions if the same family moved to downtown (thus decreasing its commute), lived in a 1600-sqft apartment and both adults worked within 2 miles of their residence.

60 points

5. Briefly summarize the VW emissions scandal. How has EU responded to this? How about the US? Try to quantify these responses, both in terms of cost to VW and potential compensations to owners of VW vehicles. *30 points*