

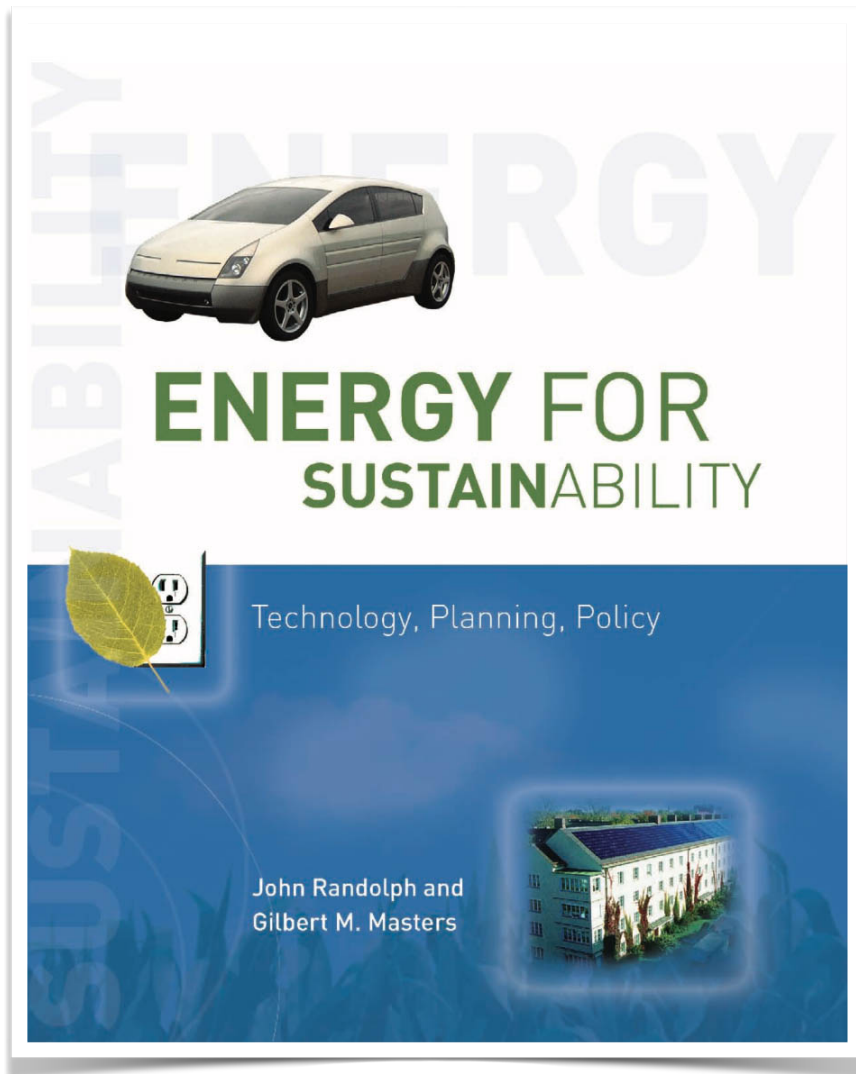
ENVS 119 - Energy & the Environment

11- **Mid-term Study Guide**

Benoit Delaveau, MS, BEAP, CEM
benoit.delaveau@sjsu.edu



MID-TERM - TEXTBOOK/READING NOTES



Randolph and Master

Chap 1, 2, 3, 4, 9, 13.

Look for specific sections in class syllabus.

All other readings assigned.

LECTURE #1 - Energy and Global Warming

- What are the 3 major sources of energy in the US?
- Explain why is energy is a social issue with a technical component?
- Describe 2 environmental impacts linked to the main 3 sources of energy.
- Explain how climate change is linked to energy use with simple numbers.
- What are the 2 solutions listed in the lecture to fix climate change?



LECTURE #2 - Energy units

- Define Energy and understand its different forms.
- Define 1st and 2nd laws of thermodynamics and low/high entropy.
- Understand efficiency factor, be able to draw the power plant to light bulb schematics.
- Understand and define Power (always On) versus Energy unit (use per unit of time). Power units? Energy units?
- Jevons paradox?
- Work on the Randolph p163.



LECTURE #3/4 - Coal Energy

- What part represents Coal in US electricity? Where is Coal mined? Name the states and main deposits. « Saudi Arabia » or Coal is where?
- Mountain top v. conventional mining. What is more efficient? (# of job v. amount of Coal extracted)
- Coal power plants emissions (Nox, Sox, Mercury) and know their individual environmental/health effects)
- Name the different type of Coal. Define each grade (energy density).
- Describe CCS, future of Coal is « dark Explain why.



LECTURE #5 - Natural Gas Energy

- Why is natural gas had a « revival » in 2003?
Define Hydraulic fracking.
- Where is Natural Gas extracted in the US? Name the states and main deposits. Where is located the « Marcellus shale »?
- Pro/cons of Natural Gas power plants?
- Issues linked to Hydraulic fracking?
(Smill and others)
- Issues linked to natural gas leak?
(Smill and others)
- Why is natural gas named
the « bridge fuel »?



LECTURE #6 - Oil and Petroleum Energy

- Define « peak oil ». When did it happened (according to slides graph)
- Link between oil and transportation. Future of auto industry?
- List the risks attached to drilling, transportation, refining process. Cite 1 example of accident for each.
- Describe auto tailpipe environmental issue. City air pollution.
- What the 5 solutions to get society off oil/petroleum within the next decades?



LECTURE #7 - Sustainable Transportation

- Know the history of BEV (Battery Electric Vehicle)
- Link between oil and transportation. Future of auto industry?
- Define Mild Hybrid, Hybrid, Plug-in Hybrid, EV, and Hydrogen cars (see textbook and quiz)
- Describe the well-to-wheels GHG and local air pollution of each type of new auto powertrain technology.
- Be able to explain the CAFE standard (US EPA car mileage and emissions standard).
- Be able to explain Tesla and other BEV industrial challenges.



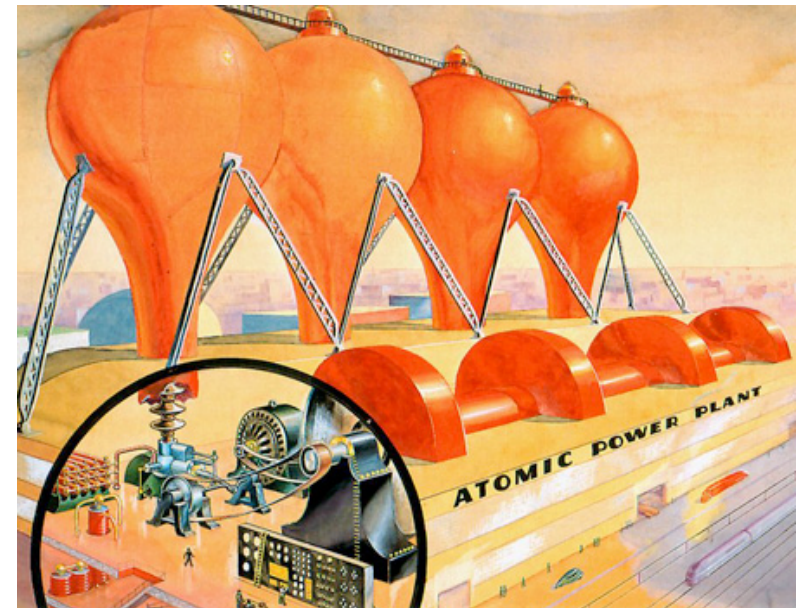
LECTURE #8 - Carbon Footprint

- Define carbon intensity of electricity. What is PG&E carbon intensity electricity on average? (assignments #1/2)
- Define carbon intensity of natural gas? What is the carbon intensity for each Therms of natural gas burned?
- Know the main dates in history that led the United Nation process to the recent Paris Protocol.
- Describe Paris Protocol. Is it ratified by the US? What are the goals of this global protocol?



LECTURE #9 - Nuclear power

- Describe the scientific dream of nuclear energy. Why did the scientific community failed society? Describe « Nuclear Denial » according to Perrow.
- Describe nuclear fission in 3-4 sentences.
- What is the main benefit of nuclear energy when it comes to climate change?
- What are the 6 listed environmental issues with current nuclear fission technology?
- US new nuclear powerplant since 1978? Globally? Fusion nuclear? Future research?



LECTURE #10 - Hydro-electric power

- Know how to calculate a dam electrical power based on height and water flow.
- Portion of renewable energy coming from hydro in the US?
- Define EROI (Energy Return on Investment)
- What are the impacts of CA drought on renewable generation?
- What are the 3 issues with hydro?
- Future of the technology? in CA? Globally?



MID-TERM ENVS/ENGR119

1. All your reading notes, graded assignments and quizzes are authorized during the test (no slides copy, no textbook, no readings hard or soft copies)

**— —No internet access (other than Canvas) during exam — —
per SJSU academic policy, any student cheating will be reported to
academic council. Exam proctored with Respondus.**

2. 30 questions total

20 multiple choices (3 pts each),

5 short math problems (4 pts each),

5 quiz's/reading questions (4 pts each)

3. Bring a calculator (better than your smartphone that will trigger Respondus)