

Environmental Science 15 – Intro to Energy

Mid Term I Study Guide

You have permission to use a single side of a letter sized piece of paper for note for during the exam. I will provide any constants or data required for your calculation (e.g. energy per kg of oil, natural gas, etc.). I will not provide any equations, you will need to be able to use them on your own. Be prepared to use any formula that you found in the homework or activities. You may need to think a little during the exam.

Chapter 1.

What is the scientific method (describe the steps, be able to recognize where you are in the process)?
What is a fuel? What is energy? What are some sources of energy? What is a greenhouse gas? How does a greenhouse gas work (selective absorber of radiation, wavelength of electromagnetic spectrum, etc.)?
What is thermal convection? Is incoming solar radiation evenly distributed across Earth?

Chapter 2.

How has the world's population changed in the past 10,000 years? Has the growth rate changed in the 20th century? What is an energy servant? What amount of electric power does an energy servant produce? Does per capita GDP relate to per capita energy consumption rate? Why or why not? What has been the trend in energy intensity (Watts/cost) in the USA for the 20th century? Is life expectancy (years) related to per capita energy consumption rate (kW)? At what point does it or does it not control life expectancy? What is the difference between end-use and primary energy accounting? Why are these different? Why do different countries have different energy consumption by sector (e.g. transportation vs. residential)?

Chapter 3.

What is energy? What is the difference between potential and kinetic energy? What are some examples of energy transfer/transformation (e.g. automobile engine converting chemical energy to thermal and mechanical energy)? What is force? What are the three fundamental forces? What is wavelength? What is frequency? What is work? What is power?

Chapter 4.

What is heat? What happens when something gains thermal energy? What happens to the density? What is heat flow? What direction does heat flow (from cold to hot or from hot to cold)? What are the ways to transfer heat energy (e.g. radiation, convection, conduction)? Can you think of examples of each? What is a Carnot engine? Is it possible to build a Carnot engine? What is specific heat? What is latent heat (e.g. for water in calories per gram)? What drives atmospheric circulation on earth? Why?

Chapter 5.

What is a fossil fuel? How are fossil fuels formed? What does it mean to be renewable? Where are oil and gas found (in the earth and in what nation states)? Are all fossil fuels distilled at the same temperature? What is the general process used to convert fossil fuels to electricity in a power plant (e.g. fig 5.9)? What is efficiency? What is Hubbert's peak? Are fossil fuels distributed evenly across earth?