PS#5, Due Tuesday, February 21

1. **What will kill you?:** Please see Meera Subramanian's Nature article *Global health: Deadly dinners* and the statistics on deaths from electricity production.
   - **a)** If you were born in an area where people use the 3-stone fires, what is the probability that it will cost you your life?
   - **b)** How does this compare with the probability of being killed in a car accident in the USA?
   - **c)** Given the amount of electricity the USA will use over your lifetime, what is the probability that it would cost you your life if this electricity was from coal-fired generation? From nuclear generation?
   - **d)** How many people have been killed recently in wars? What's the probability of an earthling dying in a war?
   - **e)** How many people have been killed in the past decade as a result of terrorist attacks? What's the probability of an American being killed by a terrorist?
2. I've heard that each person is about a 100 W lightbulb… that we put out heat at the rate of about 100 W, on average throughout our lives.
   a) Does it seem to you that this is about right if you think about the heat you give off… does it compare to be about the same as a 100 W lightbulb?
   b) Consider if you just lived and didn't exercise too much, how many calories would you consume in a day. Energy in = Energy out. So if you metabolize all the nutrients in your food into heat (a reasonable estimate), calculate the rate at which you dissipate heat into the world. Is this close to 100 W? Remember that a **C**alorie is actually 1000 thermal calories.
   c) There was one more question we could ask: Estimate your CO_2 emissions for a day knowing the carbon intensity of your fuel. We know that sugar is like wood (30 g(C)/MJ) and fat is oil (20 g(C)/MJ)
3. Fission – Fusion what is the difference between these two processes?
   a) How are these two processes different? Please give an example of each process.
   b) What is necessary to make each process happen? What do we have to do to make it happen?
   c) What are the major challenges to making each a wide-spread source of clean energy?
4. Nuclear safety, costs, etc. Nuclear power has the promise of wide spread, low carbon electricity for everyone. However, it's not widely adopted.
   a) Discuss your take on challenges to widespread nuclear adoption.
   b) Do you think that the challenges to nuclear acceptance is more real or more imaginary?
   c) Compared to last week, are you more pro-nuke or anti-nuke? Why do you think?