Physics and Mathematics of Sustainable Energy
Homework Six
Due May 24, 2013

1. You need to go from Portland, ME to Portland, OR and back. How much energy would be used if you:

   (a) Drove by yourself

   (b) Took an airplane

   (c) Took a train

2. Estimate how much energy it will take you to get home when the spring term ends.

3. You live in Bar Harbor and are deciding between two beer options for a senior party: A Hop Devil Ale by Victory Brewing Company, and Punk IPA by BrewDog Brewery. You need to purchase two tons of beer. Make reasonable assumptions about the modes of transport that will be used by BrewDog and Victory. What is the energy cost of transporting each beer to you?

4. The BHF solar cells will generate around 3.0 MWh of electrical energy in one year. How much carbon does this save per year? (Assume that the solar cells prevent the generation of 3.0 MWh of electricity every year.) How much carbon dioxide will this save in 30 years? Suppose BHF sells this "negative carbon dioxide" to someone else as an offset for $10 per ton. How much would this be?

5. Assume that it takes 50,000 kWh to make a car. If you buy a new car every eight years, how many kWh per day is this?

6. **Optional:** Suppose you live somewhere in the middle of the U.S. California wine arrives at your local wine store via truck, originating in San Francisco. Spanish wine takes a container ship from Málaga to New York, at which point it takes a truck the rest of the way. If you are in New York, it is better to get the Spanish wine. (I.e., it uses less energy. We'll assume that the Spanish and Californian wines you are considering are of similar quality and price.) Approximately where in the U.S. is the energy cost of transporting the two wines the same?