Physics and Mathematics of Sustainable Energy
Homework Six
Due May 14, 2010

1. Suppose it is -10 C outside and your thermostat is set at 15 C. By what fraction would your heating bill decrease for that day if you set your thermostat to 13 C instead?

2. Consider a modest-sized home of 2500 square feet. Assume a reasonably good R-value and that the house is not too leaky.

   (a) Estimate the power needed to heat the house on a very cold winter day in Maine. State any assumptions that you make. Express your answer in kWh/day and BTU/hour.

   (b) Compare your estimate for BTU/hour with the online calculator at `http://www.heatershop.com/btu_calculator.htm`. Is the size heater that the page recommends similar to what you estimated?

   (c) Estimate the energy needed to heat this house for the entire year. State any assumptions that you make. Express your answer in kWh/day, averaged over the entire year.

   (d) Assume that you used fuel oil to heat this house. How much carbon dioxide would this produce per year?