

# Physics and Mathematics of Sustainable Energy

## Homework Three

Due April 16, 2010

1. Estimate how much land area would be required for a wind farm that provided New York City with all of its residential electricity. State any approximations and assumptions that you make.
2. Suppose a house switched from incandescent to compact fluorescent light bulbs. Assume that a fluorescent light bulb uses roughly 25% of the energy that an equivalent incandescent light bulb would use.<sup>1</sup> Estimate how much energy this would save in a year? How far could you drive for this amount of energy?
3. In order to get her daughter Ella to go to sleep, Lena sometimes puts her in her car seat and drives until she is asleep. Another option is to put Ella in her car seat on top of the electric dryer, turn the dryer on, and wait until Ella is asleep. Assume that both techniques are equally effective. Which uses more energy? Which costs more? Explain any assumptions that you make.
4. Hand in a rough draft of where you are with your personal list of energy benchmarks.

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<sup>1</sup>[http://en.wikipedia.org/wiki/Compact\\_fluorescent\\_lamp#Energy\\_efficiency](http://en.wikipedia.org/wiki/Compact_fluorescent_lamp#Energy_efficiency)