

Lab 02: Watt Meters

Physics and Mathematics of Sustainable Energy

September 27, 2024

College of the Atlantic

The **goals** for today are for you to:

- Learn how to use Watt meters
- Practice doing energy and power calculations
- Start getting a feel for how much energy is used by different appliances

Guidelines

- Please work in pairs or trios. When you are done, please scan this worksheet (as a pdf if at all possible), and upload to google classroom.
- This assignment is not graded, but I will look these over. I'm asking you to submit this mainly so that I can see how folks are doing in general, what questions people have, etc.

Names: _____

1. Getting Started

- (a) Say hello to others in your group.
- (b) Grab a watt meter
- (c) Figure out how to use it. Plug it in to an outlet, and then plug something in to the meter. Press buttons on the meter and see what happens.
- (d) One of the TAs or I will come over and answer any questions you have about how the meter works and what the different settings mean.

2. Measure the power drawn by several electrical things (heater, kettle, microwave¹, phone, computer, etc. For each, record the power.

(a) Electrical Thing 1:

(b) Electrical Thing 2:

(c) Electrical Thing 3:

(d) Electrical Thing 4:

¹Please do not use the microwave with the microwave empty!!! This can damage the microwave. Thanks.

3. Choose something that draws a good amount of power: at least several hundred watts (the electric heater or toaster would work well).

(a) Use the Watt meter to measure how much power it draws.

(b) How many kWh would the thing use if you kept it on for five minutes? Answer this question by doing a calculation.

(c) Use the cumulative function² on the Watt meter to answer the same question. Set the cumulative energy to zero, plug in the thing, and watch the energy slowly but steadily increase while the thing draws power.

4. Electric heaters.

(a) If you haven't already done so, measure the power drawn by one of the electric heaters.

(b) Assume that this electric heater is on for eight hours a day for five months. How much electrical energy has the heater used?

(c) How much would this electrical energy cost in Maine?

(d) What emissions are associated with this electrical energy?

²One of the TAs or I can show you how to use this.

5. Light bulbs.

(a) There are three different types of light bulbs. Measure the power drawn by each:

i. incandescent

ii. florescent

iii. LED

(b) How much energy would you use in a month if you kept the light on for four hours a day:

i. incandescent

ii. florescent

iii. LED

(c) Express the above energies as a fraction of the energy used each month by an average Maine home.

i. incandescent

ii. florescent

iii. LED

6. Please check with me before leaving. (I want to quickly look over your answers and see if you have any questions.)