A Practical Example
of
Energy and Power

In this brief paper, I'm going to put the concepts of "energy" and "power" into perspective, using an easy-to-understand example.

First, there's the measure of energy known as the *foot-pound*. This is part of the English system of measurements, and isn't used much anymore. But what this means is, if you set a one-pound weight on the floor (or a table), and lift it up one foot, you will expend one foot-pound of energy.

Now, put the one-pound weight away, and find a 74-lb weight. Lift that one foot off the floor or table. This will require 74 foot-pounds of energy. Now, the reason I picked "74" is there's another unit of measure in what's called the "SI System of Measurements" known as the *joule* and it turns out 74 foot-pounds is equal to 100 joules. Restating, if you lift a 74-lb weight one foot, you'll have expended 100 joules of energy.

(Technically, it also takes 100 joules to get it back to floor. Gravity is supplying this energy. For our purpose, we're ignoring that.)

Now, none of this implies how much time it took you to lift that 74 pound weight. You might have taken a quarter of a second, or you might have taken a quarter of an hour. Regardless, the energy you expend will be 100 joules.

When we add the time dimension, we introduce the concept of *power*. If you lift 74 pounds in one second, you have expended 100 joules per second (abbr. joules/sec) of *power*, and one joule per second is called the *watt* (at last – a familiar term). So, over that one second you will have expended 100 watts of power.

Now pick up the weight and set it back down, and repeat this cycle so that you do one lift per second. For as long as you keep this up, you will be expending 100 watts (or, again, 100 joules/sec) of power.

Now think about that 100 watt light bulb you have outside and run all night. First, that 100 watts is what the bulb takes in – what it takes to operate it – and not the light and heat it puts out. Mostly, it's heat.

The amount of power required for that one, single bulb is equivalent to the power you expended to lift that 74 pound weight, one lift per second. To keep that bulb burning, the power company has to create that much power (even more in fact, since power is lost in transmission), and they can't stop when they get tired. They have to keep this up all night long. All for one light bulb.

Credits

Special thanks go to:

- **Prof. Richard Wolfson**, Middlebury College, and his Teaching Company DVD series “Physics in Your Life”
- **Wikipedia.com**, for more reference material than can be listed.