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What's in a Watt?

Watt is a word most people have seen – from their electricity bills to the labels on many electrical appliances – but it is also a word that many of us don't have a good understanding of. We can't pick one up, like a kilogram; or walk one, like a kilometer. We just have to trust that the light bulb we put into the light socket really does consume 60 Watts of electricity. So what is a Watt?

The Watt is a unit of power, which means it tells us how quickly we are using (or producing) energy. For electricity, we measure energy in Joules, and so 1 Watt means that 1 Joule is being used every second.

Energy can be stored in many forms, and the energy in your food is just as useful as the energy in a lump of coal, or in the water stored behind a dam. The energy stored in all three of these things can be converted into more useful forms of energy such as heat, light, sound, movement, and even more food – we just need different machines make it so. The coal needs to be burned, the water dropped, and the food eaten. So if we could relate the Watt to the amount of food we eat, it might become a little easier have a physical understanding of just what is in a Watt.

A healthy adult body will burn about 2,000 Calories in a day. The Calorie is just another unit of energy, and is equal to a little over 4000 Joules – so it takes roughly 8,000,000 Joules of energy a day to run an adult body. That means on average, a typical North American uses about 100 Joules a second, or 100 Watts.

All things considered, that is a surprisingly small number. Before the advent of CFL bulbs, many people had (and some still do) several 100-Watt bulbs in their house. Each of those bulbs was using the same amount of energy that a typical human requires to go about their daily business. Add up all of those light bulbs in your house (and all the other users of electricity), and all of a sudden we see that the average Canadian house uses enough energy to support about 35 people - and that's just your house.

It can be a little overwhelming to realize just how quickly and easily we can use up massive amounts of energy, without giving it a second thought. I'll admit to borrowing (and adjusting) this fact from David Hughes of the Geological Survey of Canada. If you took the average New Brunswicker and put them on a treadmill, and asked them to start walking to generate electricity, they could probably manage to generate 100 Watts of electricity. If you paid them to do that for 40 hours a week, with 2 weeks of vacation and statutory holidays, it would take almost 9 years to generate the same amount of energy as in a barrel of oil, and you'd have to pay them $140,000 even at minimum wage. Makes you realize that even $100 a barrel, oil is still a pretty amazing deal – especially considering the average Canadian puts the equivalent of almost nine barrels of oil into their vehicle each year.

So what do we pay for different forms of energy?

For gas, we pay about $0.03 for a million Joules of energy. It costs pretty much the same to buy that amount of energy in electrical form. However, in food form, it costs roughly 11 times as much ($0.35) to buy that energy in potatoes, and 130 times as much in chicken ($4).

It's easy to forget just how cheap the energy really is that we use in our homes and our cars – it just seems like a lot because we use such astronomical amounts of it. Most of the energy we use has been converted to and stored in its current form for millions of years – and we are consuming it an alarming rate, primarily because it is so cheap and readily available. It's staggering to think that in the last 25 years we have used as much oil as the rest of human history combined. I know, this is not a good news story for this festive time of year, but understanding is the first step to making a change.

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