## Power

Sometimes in daily conversation, people use the words energy and power interchangeably. Is this true? Are they the same things? No. They aren't.

If not - what is the difference?

What does NB Power sell?

• Energy.

## Power

Power is the rate of energy transformation. $P = \frac{E}{t}$ $\left(\text{Power} = \frac{\text{energy}}{\text{time}}\right)$

So if we are talking about power plants, it would be how much energy the plant produces per second. If we are talking about an electrical device, it's how much it uses per second.

$P = \frac{E}{t}$

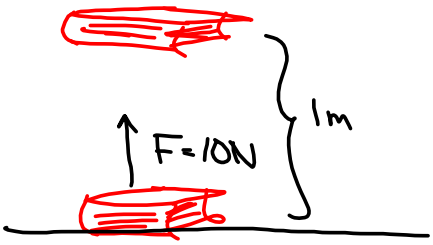

$E = Pt$

$t = \frac{E}{P}$

## Units

The most common SI unit of energy is the Joule (J)

calories (cal), kilocalories (kcal, or Cal) and BTUs (British thermal units - a non metric unit) are other common units of energy.




Work = Force x Distance

$W = Fd$

To lift a textbook that weighs 10N a distance of 1m requires

$W = Fd = (10N)(1m) = 10J$ of work

## Units (continued)

Since Power is the rate of energy transformation (Energy / time), the SI unit of power is a Joule/second also call a Watt (W).

1 watt = 1 J/s (1 Joule of energy each second)

For large amounts of energy (like buying from NB Power), the common unit is the kilowatt-hour, which equals 3.6 million joules, or 3.6 MJ.

It would take Luke 5 days non-stop lifting the textbook 360 000 times to use 3.6 million joules!

How much does NB Power charge for this much energy?

14¢

If your hair dryer uses 750 W of power, and you use it for 10 minutes, how many Joules of energy does it use? In New Brunswick, energy costs about 4 cents per megajoule (MJ). How much would this cost?

$E = P \times t$ ← in seconds

$= (750\ W) \times (600\ s)$

$= 450000\ J$ $(\div 1000000)$ $1\ MJ = 1000000\ J$

$= 0.45\ MJ$

$10 min \times 60 \frac{s}{min} = 600 s$

Cost = E × rate

$= 0.45\ MJ \times 4¢/MJ$

$= 1.8¢$

How much energy would a 9 W light bulb use if it were left on for an entire month (30 days)? At 4 cents per MJ, how much would this cost?

$E = P \times t$

$= 9\,W \times (2\,592\,000\,s)$

$= 23\,328\,000\,J$

$= 23.328\,MJ$

$t = 30\,days \times \frac{24\,h}{day} \times \frac{60\,min}{h} \times 60\,s/min$

$= 2\,592\,000\,s$

$Cost = 23.328\,MJ \times 4¢/MJ$

$= 93.3¢$

Exit questions - to be passed in the bin at the back before you leave:

What is the difference between energy and power?
What is one (practical) way your family could reduce energy use?

## Homework:

Do some research: How much energy does the average home in New Brunswick use per year?