Notes: Energy Efficiency

# Recall

* One of the electrical functions in a circuit is:
  + **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    - E.g.: light bulbs, speakers, heating elements, etc.

# Energy efficiency

* Problem is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**of the energy is usually **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** into the form we want
  + Ex: when you turn on a light bulb **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**of the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is transformed into **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
  + A lot of it is actually converted into **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    - In fact, with an incandescent light bulb, only about **\_\_\_\_\_\_\_**of the electrical energy ends up as light energy
* We can represent **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**of the energy consumed by a device is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**into the type of energy we want (known as **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**)
  + **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**gives the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of energy consumed by a device that is actually transformed into **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**
* This is the equation we use:

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Keep in mind: the total energy always has to be **BIGGER** than the useful!

**Total > useful**

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| Vocabulary  * **Consumed energy**   + The **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**that we started off with   + The amount of energy **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** * **Useful energy**   + The energy **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**     - The portion of the energy that **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** * **Lost energy**   + The energy that is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**     - It’s lost to other systems     - Most often energy is lost through **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |

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| * **Consumed energy**   + *Consumed energy (total)= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* * ***Useful energy***   + *Useful energy = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* * ***Lost energy***   + *Lost energy =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* |

# Practice

**Example 1:** A compact fluorescent light bulb (CFL bulb) is more efficient than an incandescent or a halogen light bulb. Still, not great. A 13 watt CFL bulb operating for 10 hours consumes 468 000 joules of electrical energy. In this time the bulb gives off 39 780 joules of radiant (light) energy. Determine the efficiency of this CFL light bulb.

**Example 2:** Car motors are not very efficient. Only about 12% of the chemical energy in gasoline (consumed energy) actually turns the wheels to make the car move (useful energy). How much chemical energy is consumed by a car in order to provide 600 000 J of energy to turn the wheels and make the car move?

**Example 3:** An electric kettle uses 1600 watts of power for 5 min. in order to boil 1 L of water; 300 000 J of thermal energy was absorbed by the water in this time. Calculate the energy efficiency of this kettle.