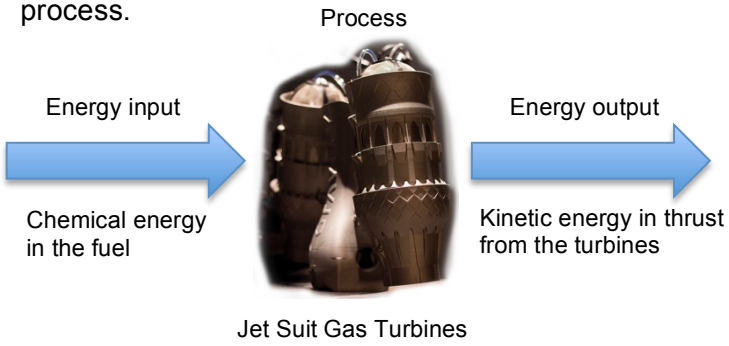
ENERGY TRANSFER STEM

There are several different **types of energy** which can be **transferred** from one type to another. **Energy transfer diagrams** show these transfers in process.



Jet Suit Gas Turbines

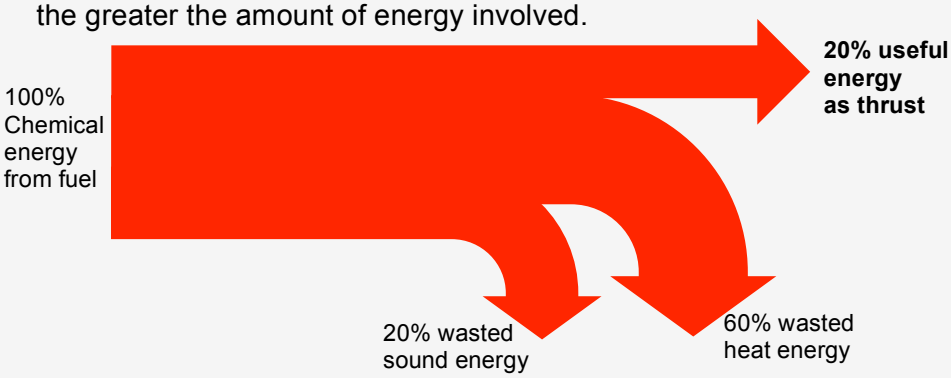
More efficient devices transfer the energy supplied to them into a greater proportion of useful energy.

Types of Energy

- **Magnetic** - Energy in magnets and electromagnets
- **Kinetic** - The energy in moving objects.
- **Heat** - Also called thermal energy.
- **Light** - Also called radiant energy.
- **Potential** - Stored energy in raised objects.
- **Chemical** - Stored energy in fuel, foods and batteries.
- **Sound** - Energy released by vibrating objects.
- **Electrical** - Energy in moving or static electric charges.
- **Elastic Potential** - Stored energy in stretched or squashed objects.
- **Nuclear** - Stored in the nuclei of atoms.

Energy can be **transferred** usefully, stored or dissipated. **It cannot be created or destroyed**. The chemical energy transferred from the fuel to kinetic energy in thrust of the Jet Suit pilot is the useful transfer; the rest is **'wasted'** as sound energy and heat energy.

Sankey diagrams summarise the main energy transfers taking place in a process. The thicker the line or arrow, the greater the amount of energy involved.



This thermal image of a Gravity Jet Suit pilot shows the amount of energy wasted in heat.

In this example, the efficiency of the engine is 20%. How efficiently an engine converts fuel into useable energy is a key commercial factor.

When a **force** causes a body to move, work is being done on the object by the force.
Work is the measure of energy transfer when a force (F) moves an object through a distance (d).
When work is done, **energy** has been transferred from one energy store to another,
and so: ***energy transferred = work done***

Energy transferred and work done are both measured in **joules (J)**.
The amount of work done when a force acts on a body depends on two things:

the size of the force acting on the object
the distance through which the force causes the body to move in the direction of the force

The equation used is: **work done = force × distance**

$$W = F \times d$$

work done (*W*) is measured in joules (J)
force (*F*) is measured in newtons (N)
distance (*d*) is in the same direction as the force and is measured in metres (m)

So, for the Gravity pilot in the picture whose Jet Suit is delivering a total of 1,430N of thrust:

W = 1,430 x 3 = 4,290 J