ENERGY STORAGE

This mobile revision pdf is based on detailed work found in the Technology and the Environment section of the website.

Tap on the green link button below to go to the complete website section

Tap the blue button to view areas covered by this Revision PDF

ENERGY STORAGE

1. MECHANICAL SYSTEMS SPRINGS

2. PNEUMATICS

3. HYDRAULICS

4. FLYWHEELS

5. BATTERIES

6. ENERGY SAVING DEVICES

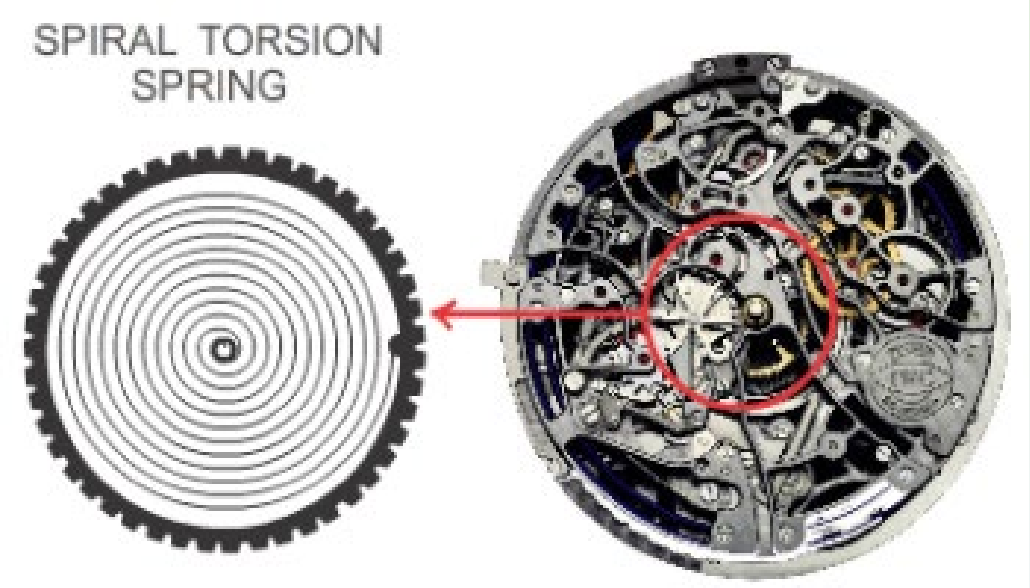
7. LARGE SCALE ENERGY STORAGE

ALSO DOWNLOAD THE APP CALLED "ENERGY PRODUCTION" FROM THE MOBILE APP SECTION OF www.technologystudent.com

WIND-UP WATCH

When winding up a coiled watch spring (spiral torsion spring) the energy is stored and slowly released, providing power to the watch mechanism. This is basically the same mechanism that provides power to wind-up radios, timers and some torches. When in tension, the watch spring shown to below, slowly releases its energy. The gear wheel on the outer rim turns and meshes with other minute gears, accurately turning the watch hands.

Tap the image for information / an exercise



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COMMERCIAL SPRING POWERED - ENERGY STORAGE SYSTEM

This is an energy storage system using springs. This is on a large scale, but is not dissimilar to the coiled spring in a watch. When excess energy (electricity) is available, it is used to 'force' fluid into the high pressure storage unit which expands to full capacity. When additional electrical energy is required, the fluid is allowed to escape, turning turbines, producing electricity.

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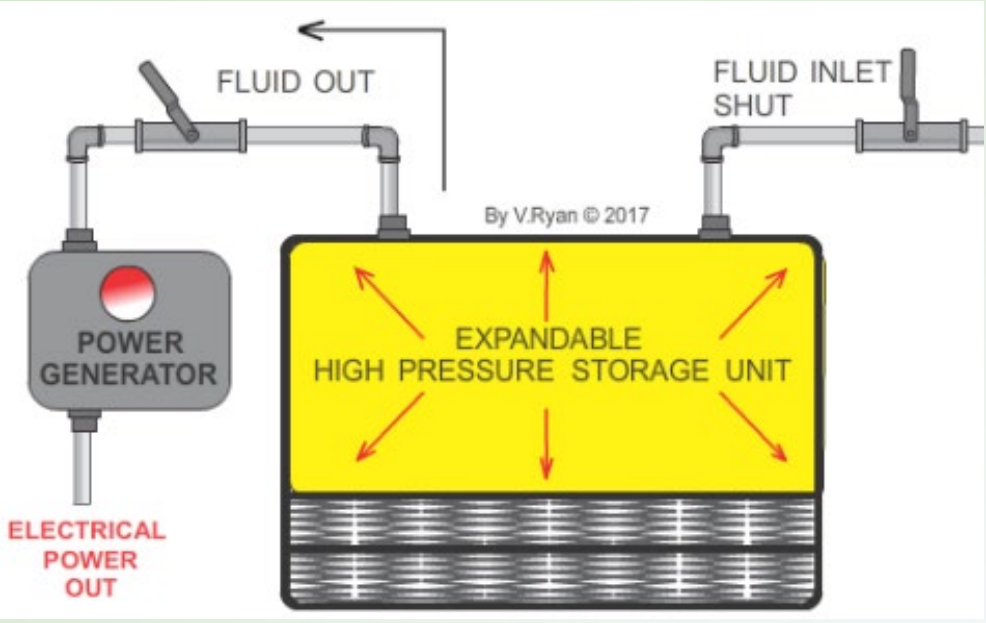

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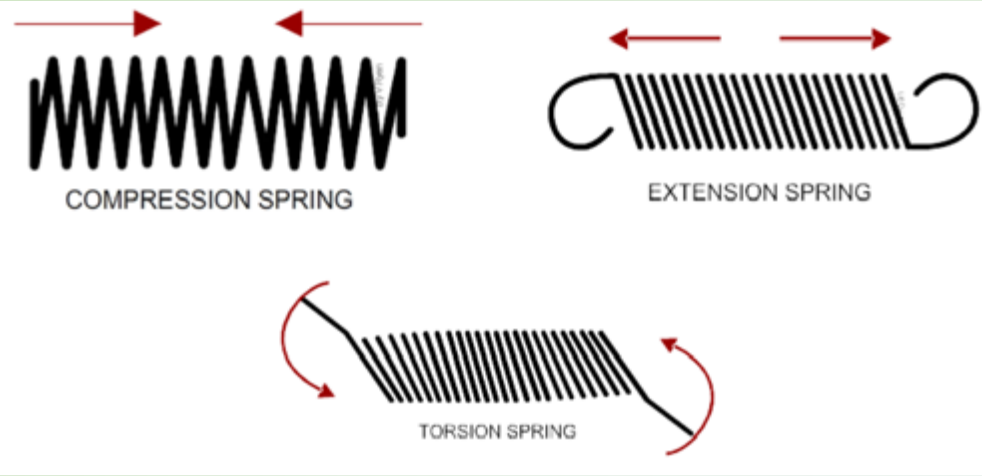
MORE ON SPRINGS?

Springs are available in a large variety of shapes and sizes.
Springs perform different actions. Some restrict stretching whilst others restrict compression.

Tap the image for further information and animations



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PNEUMATICS

A pneumatic system, is a system that works from stored air pressure. The pressure is built up using a compressor. The pressurised air can be sent round a circuit, operating a variety of valves and pistons. Pneumatic systems are often seen on production lines, as they are extremely reliable and require very little maintenance. A pneumatic system can be viewed as an energy storage device, with being energy released when it is needed.

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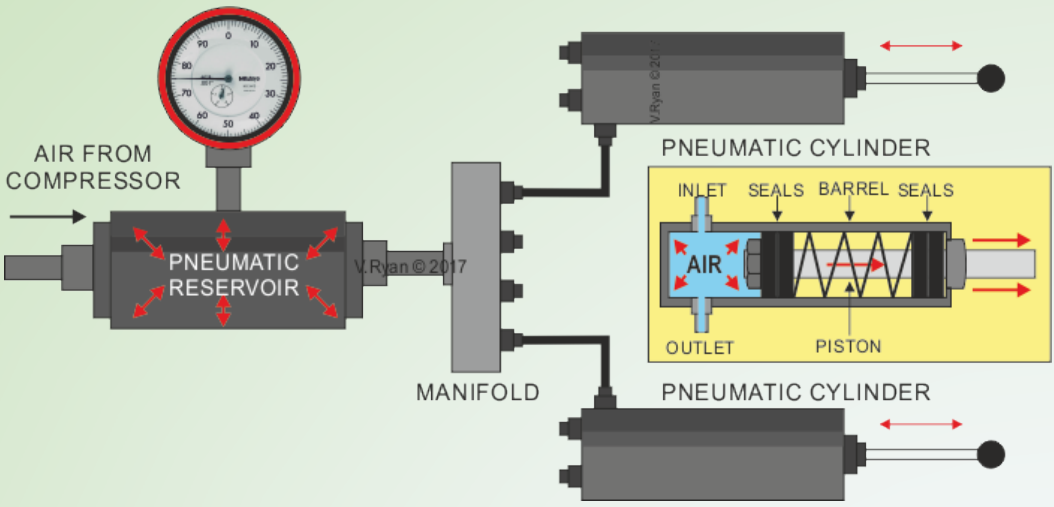

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HYDRAULICS

Hydraulic systems are similar to pneumatic systems. They use a fluid, usually oil. Hydraulic systems tend to be much more powerful than pneumatic systems and this is often the reason for them being used in transport, such as the brakes on lorries or transportable cranes. Hydraulic systems require a compressor, which pressurises fluid (oil). The pressure is stored until it is needed.

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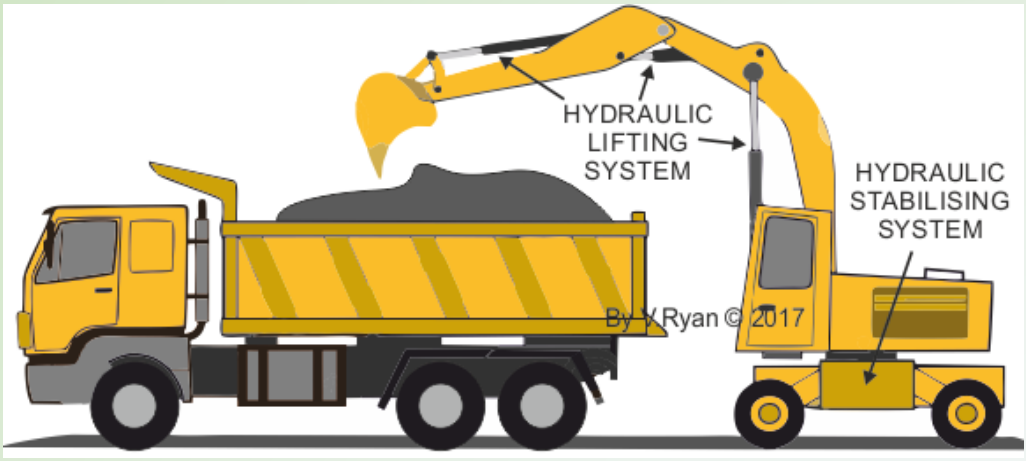

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FLYWHEELS

A fly wheel is a mechanical system, usually in the shape of a wheel, that stores rotational energy. As flywheels tend to be heavy, a lot of energy has to be applied to make one spin. Flywheels require a lot of force to make them stop and it is this that makes them very useful for storing energy. The fact that they tend to keep spinning, is due to their 'angular momentum'. It is this momentum that can be used later, often to produce electrical power.

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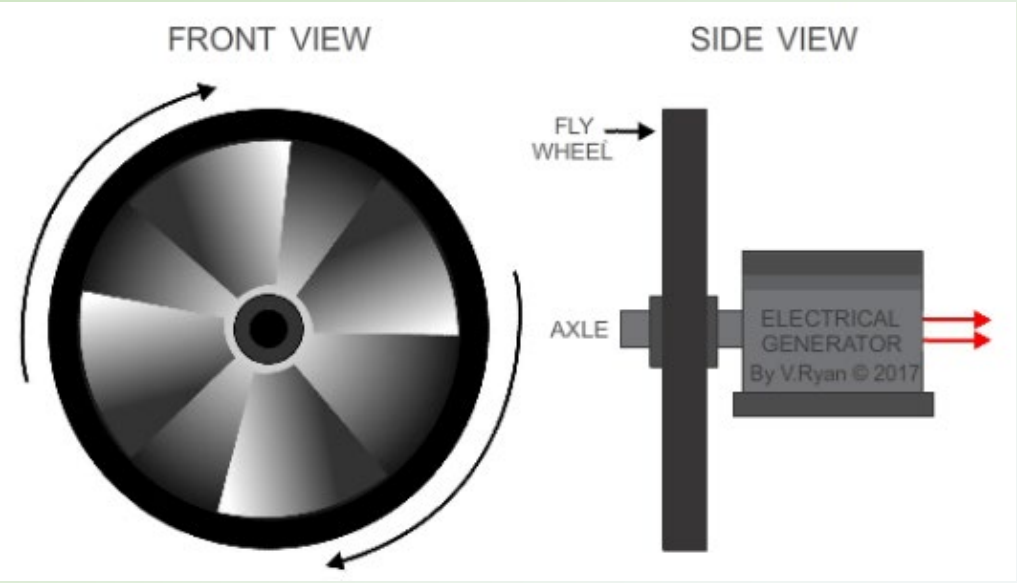

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FLYWHEELS

A company called ‘Hitec Power Protection’, manufacture energy supply systems, which include a flywheel. They provide uninterrupted and continuous power, without the need for batteries (which are environmentally unfriendly). A diesel engine provides the backup power and also recharges the induction coupling (flywheel), which is now ready to produce electricity, if the situation arises

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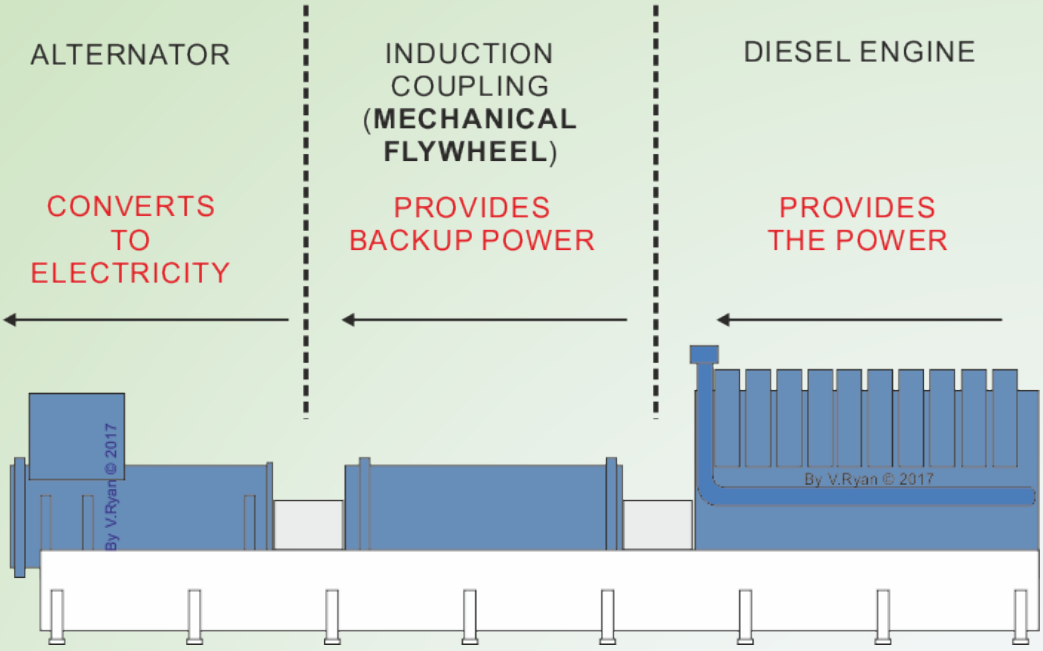

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DISPOSABLE BATTERIES

Batteries come in all shapes and sizes. They store electrical charge and as we all know, when they are put into an electronic device such as a portable radio, they provide the power. The usual battery sizes are seen below. They range from 1.5 volts to 9 volts.

Tap the image for information / an exercise

ALKALINE BATTERIES

D C AA AAA 9v

BUTTON CELLS/BATTERIES

Button batteries are usually rated at 1.5 volts or 3 volts and consequently they are used in devices that need very little power E.G. watches

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RECHARGEABLE BATTERIES

Rechargeable batteries are common in lots of electronic devices, ranging from phones to radios and torches. Modern rechargeable batteries can be recharged relatively quickly, unlike the early versions. They can also be recharged thousands of times, making them environmentally friendly compared to alkaline batteries.

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TYPICAL PHONE RECHARGEABLE BATTERY

COMMON RECHARGEABLE BATTERIES BEING CHARGED

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WHY ARE RECHARGEABLE BATTERIES A BETTER ALTERNATIVE TO DISPOSABLE BATTERIES?

1. They can be recharged hundreds / thousands of times, no need to buy new batteries.
2. They reduce environmental damage, as disposable batteries often end up in landfill, leaking their dangerous, toxic materials.
3. They are a better economic choice.
4. Using rechargeable batteries shows your commitment to protecting the environment.
5. They help to reduce our carbon footprint.

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WIND UP CHARGERS

Energy saving devices now exist, such as torches and radios, that do not require batteries to be changed. An example is the torch seen below. It contains rechargeable batteries, that can be charged by winding the handle for several minutes. As the handle is turned a electrical generator produces electricity that is stored in the rechargeable batteries.

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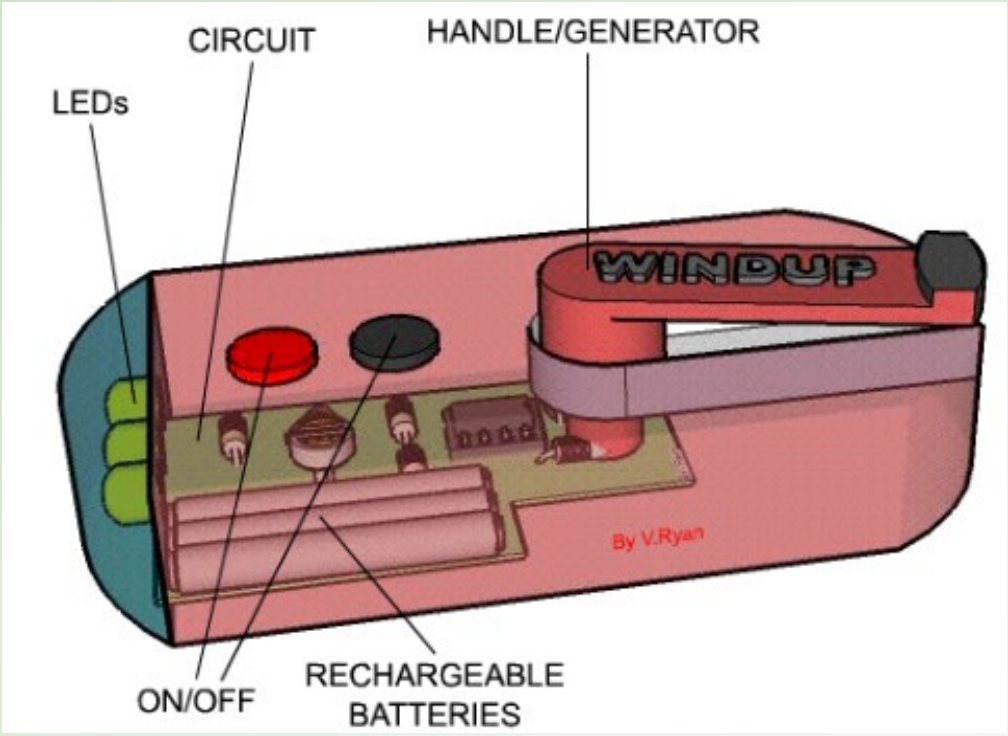

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WINDUP CHARGERS

When out walking/hiking the mobile phone cannot be recharged by plugging into mains electricity. The only option is to use an environmentally friendly charger such as a windup charger. This is especially useful in emergency situations.

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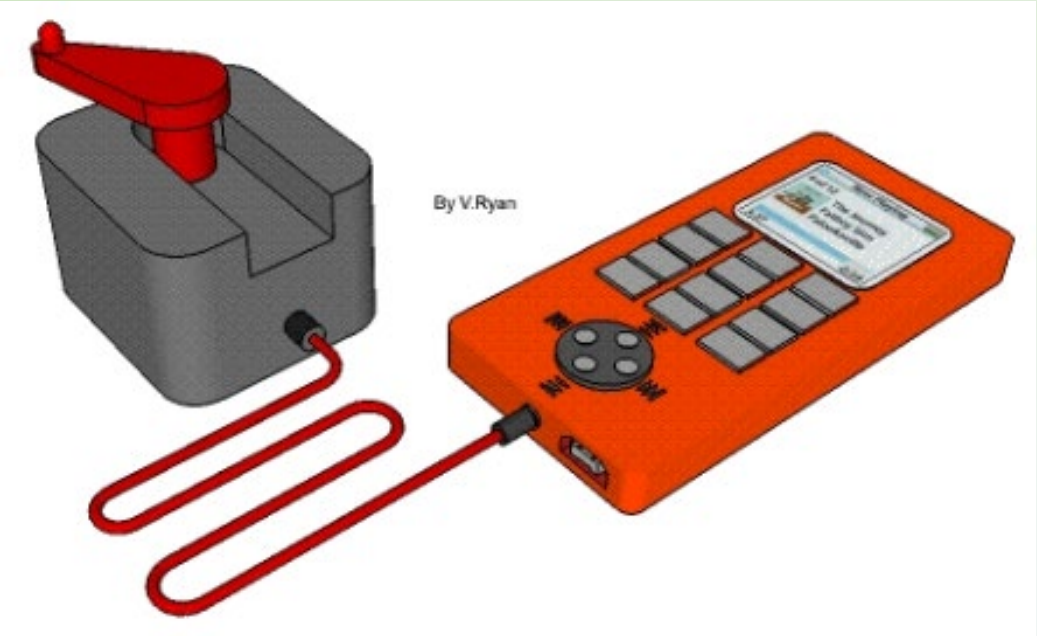

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SOLAR CHARGERS

The radio shown below contains rechargeable batteries, that are charged by a solar panel on the back. If the radio is left on a windowsill when not in use (during the daytime), the solar panel delivers enough electrical charge to replenish the batteries. When the radio is in use, the batteries release their store of electricity at a constant rate. Increasing the volume uses more stored electricity

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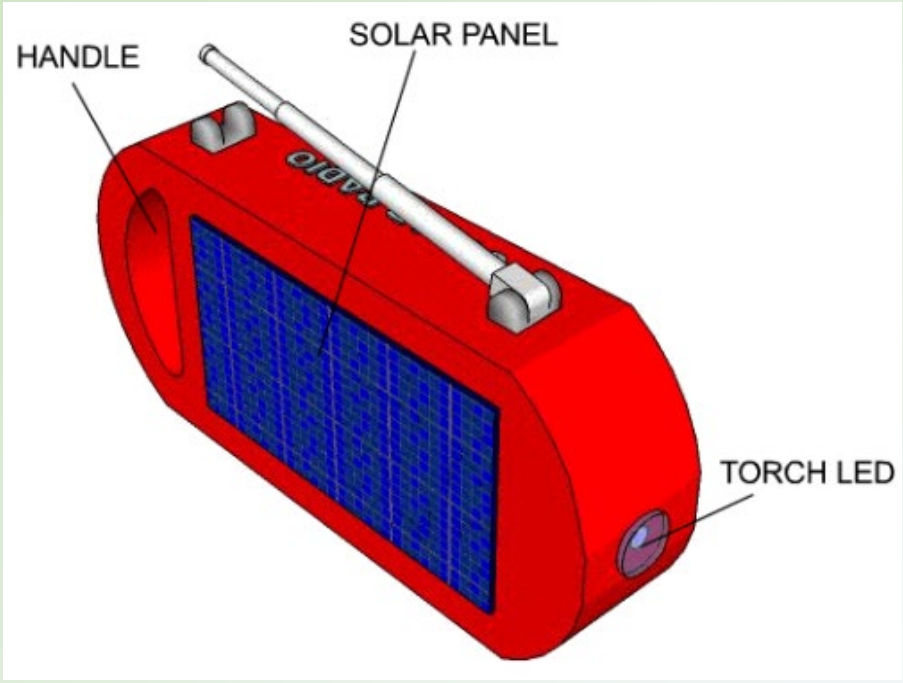

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MAGNETIC FORCE TORCH

The Magnetic Force Torch is an unusual LED torch. It is composed of a circuit which includes a heavy duty capacitor. As the torch is shaken a rare earth magnet passes through a copper coil producing electricity. The electricity is stored by a capacitor for use when light is needed. A low power ultra bright LED provides the light. Shaking the torch for one minute provides enough electricity for up to twenty minutes.

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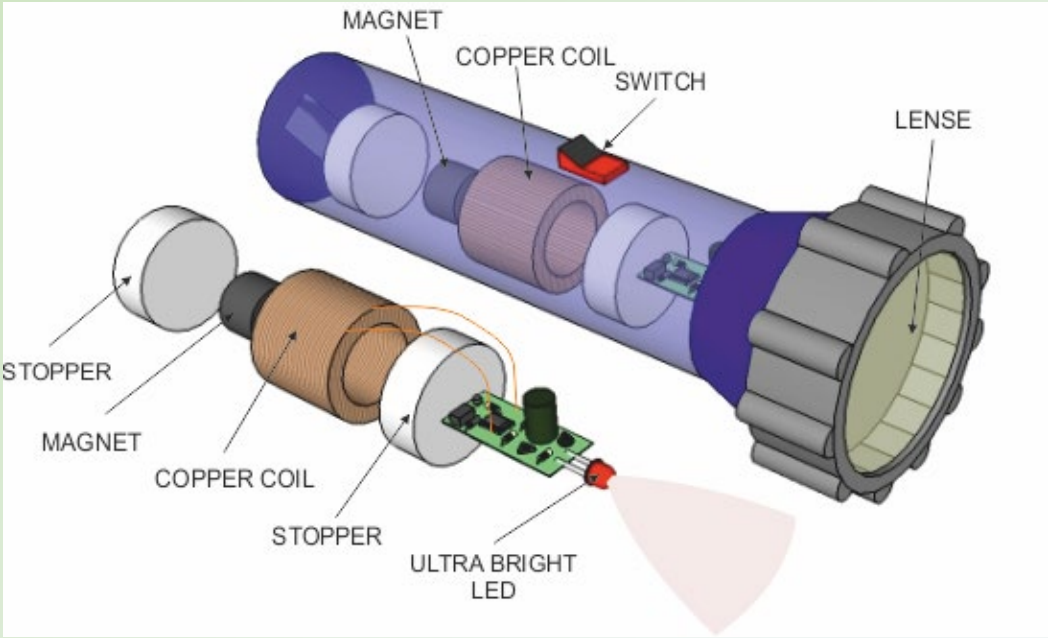

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DAMS / HYDRO ELECTRICITY

A typical setup requires the construction of a dam. Behind the dam, water is allowed to build up forming a large, deep lake. A typical dam may take years to construct and cost millions of Dollars / Euros and consequently a dam must stay producing electricity for many years (perhaps even decades) - in order to produce electricity profitably.

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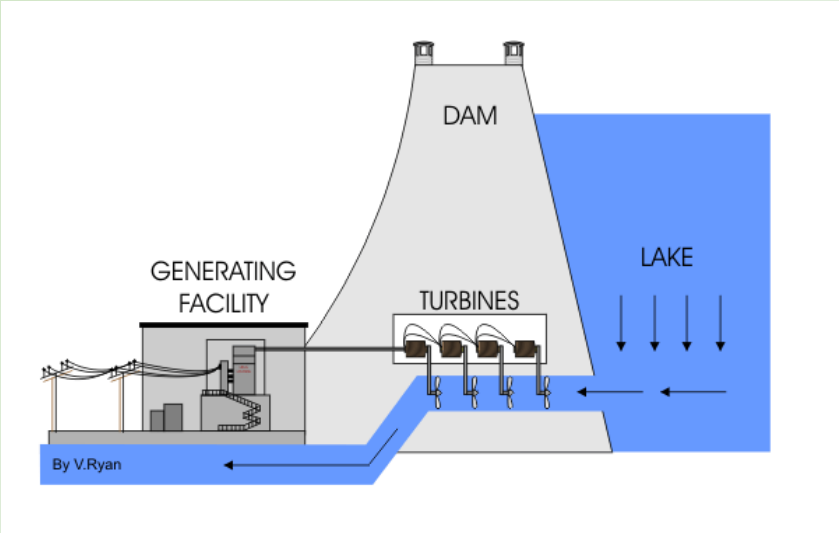

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PUMP STORAGE SYSTEMS

The system is generally used to support the National Power Grid at peak times, when demand for electricity is at its greatest. Water is released from the high lake when electricity is needed. At night time the water in the low lake is pumped back up the mountain to the high lake, for use again.

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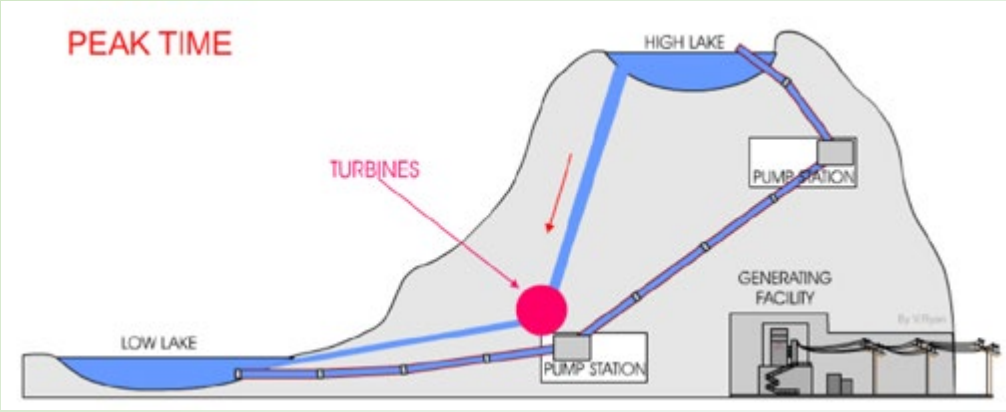

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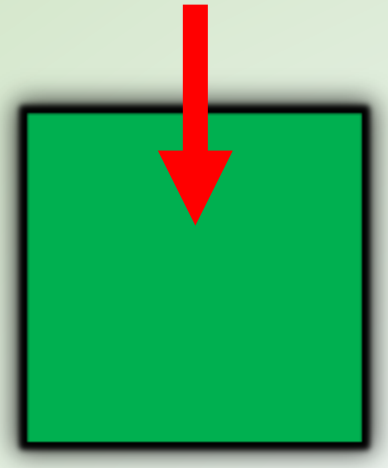
Tap on the link button below, for disadvantages and advantages of **HYDROELECTRICITY**.

DISADVANTAGES AND ADVANTAGES



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