

GCSE AQA Design and Technology

Energy Generation

What you need to know:

- To understand how power is generated from renewable and non-renewable sources and be aware of the arguments for and against.

Energy generation
 There are many ways to convert energy the two main categories are:

- Fossil fuels (finite)**
- Renewables (non-finite)**

Turbines & generators

Most forms of electricity production involve a rotating turbine which turns a generator. Fossil fuels are burned, this heats the water resulting in steam which turns the turbine which is linked to a generator to create electricity.

Renewable energy the energy is harnessed from the wind (wind turbines), wave (tidal) or falling water (hydroelectric) is converted into mechanical energy which rotates the turbine. A generator converts the mechanical energy into electricity.

- Rotating generator converts wind energy to electricity
- Transformer increases voltage for transmission to substation
- Substation increases voltage for transmission over long distances
- Transmission to the grid

All Other Generation Sources

Non-Renewable Resources

Traditionally designers have made products from raw materials that come from non-renewable (finite) resources that are in limited supply. Examples of these include oil, ores and minerals. They are natural materials but they will eventually run out.

WE CAN'T MAKE MORE

Fossil Fuels

Fossil fuels (coal, oil & gas) are considered finite as they can not be replaced. 55% of Britain's electricity is generated from coal and gas.

Renewable Resources

Renewable means we can create more as long as they are regrown or replaced this includes materials like paper & wood. Energy that comes from the non-finite resources are considered renewable. This includes wind, wave, solar, geothermal, tidal and biomass.

WE CAN MAKE MORE

Biofuel

Biofuel is a way of producing energy for transportation & heating. Oli and starch producing crops are grown, harvested and refined into a number of products such as biodiesel. This process is known as biomass energy production.

Solar Energy

The photovoltaic effect involves the conversion of solar energy into electrical energy. The solar panel capture the sun's rays and converts them into electrical energy.

- Photovoltaic Array converts solar energy to direct current electricity
- Inverter converts direct current to alternating current
- Breaker box provides an interconnection point to the consumer or grid
- Meter measures the energy from the solar array and the building load

Nuclear power

The controversial method of energy, it is considered clean & efficient. The process takes place in the reactor vessel, control rods in and out of the reactors core to regulate the power generated. The reaction generates vast amounts of heat like other methods and generates power to the and generator. The downside to nuclear power is that the waste product produced from the reaction is radioactive and very dangerous to all forms of life. It must be contained and stored correctly so the radiation doesn't leak. This is usually underground and this waste will be radioactive for years.