Cyfoeth Naturiol Cymru
Natural Resources Wales

Resource cards

Energy comparison

Renewable energy

Renewable energy sources replenish themselves and can be used infinitely. Examples of renewable energy include:

Wind

What is it?

Turbines harness kinetic energy from naturally flowing air in the Earth's atmosphere.

Advantages

- Infinite energy supply
- Clean energy supply
- Efficient use of land
- Low cost energy

Disadvantages

- Costly to build
- Can be undesirable in unspoilt areas due to visual impact
- Can disrupt bird and bat populations
- Causes light pollution from turbines being lit at night

Wave and Tidal

What is it?

Energy harnessed from the movement of water in the sea.

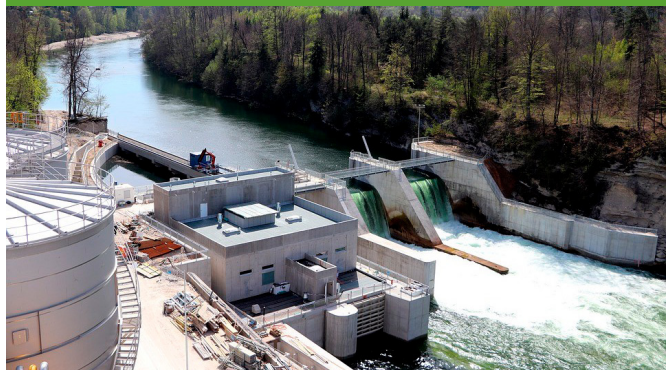
Advantages

- Clean energy supply
- Infinite energy supply
- Helpful in mitigating supply gaps in solar and wind
- Reliable and predictable supply
- Long lasting equipment

Disadvantages

- Expensive to build high tidal power plants
- Only suitable in certain locations
- Schemes can block wildlife migration and alter the movement of water affecting marine lifecycles
- Turbines can kill wildlife that tries to swim through them

Hydroelectric



What is it?

Energy harnessed from the movement of water in rivers and lakes.

Advantages

- Renewable energy
- Low emissions
- Can help with flood control
- Safe and reliable
- Can help regulate water supply

Disadvantages

- Costly to build
- Can cause flooding of surrounding communities and landscapes
- Built barriers, e.g. dams and weirs, have major ecological impacts including blocking wildlife movement, altering water flow, and causing sedimentation
- Can be affected by drought

Solar

What is it?

Harnessed light and heat energy from the sun.

Advantages

- Pollution free
- Inexhaustible fuel source
- Infinite energy supply

Disadvantages

- Doesn’t collect energy at night
- Unreliable in poor weather conditions
- Requires large surface area

Biomass

What is it?

Organic material that comes from plants. Biomass contains stored energy from the sun, which has been generated through the process of photosynthesis.

Advantages

- Low cost
- Plentiful supply
- Disposes of waste material
- Sustainable

Disadvantages

- Burning of material such as wood, releases stored carbon dioxide into the atmosphere which contributes to greenhouse gases and poor air quality
- Reduces the amount of available organic matter that forms habitats and food for organisms and creatures and supports soil creation

Geothermal

What is it?

Water and/or steam carry heat contained within the sub-surface of the earth to the surface.

Advantages

- Naturally occurring hot water and steam can be harnessed and used for human needs
- Abundant energy source that is available anywhere on Earth's surface
- Can be used on a small or large scale
- Sustainable

Disadvantages

- Environmental impacts can be high as greenhouse gases are released into the atmosphere during digging
- Difficult and costly to access
- The most active sources are mostly found along major tectonic plate boundaries where most volcanoes are located

Non-renewable

Non-renewable energy comes from fossil fuels. Fossil fuels are formed from the remains of living organisms millions of years ago. Examples of non-renewable energy include:

Nuclear

What is it?

The energy in the nucleus (core) of an atom that is released when the atom is forced to break apart.

Advantages

- Produces cheap fuel
- Does not contribute to global warming
- Does not contribute any air polluting gases
- Power stations have very long lifetimes

Disadvantages

- Can have catastrophic impacts on people and the environment during large scale accidents
- Disposal of radioactive waste is expensive and difficult
- Wastewater causes pollution that affects marine and river wildlife
- Building and decommissioning power stations is expensive

Natural gas

What is it?

Carbon and hydrogen rich material is converted into natural gas, through the process of pressure and heat over millions of years.

Advantages

- Burns more cleanly than other fossil fuels
- 45% fewer carbon emissions than coal and oil
- Less costly than other fossil fuels
- No waste to get rid of

Disadvantages

- Highly flammable
- Will eventually run out
- Costly to access
- While carbon dioxide emission is not that high, burning natural gas releases other greenhouse gases

Crude oil

What is it?

Carbon and hydrogen-rich material is converted into liquid oil, which is refined to become petroleum, through the process of pressure and heat over millions of years.

Advantages

- Can be used in liquid, solid, or gaseous forms
- High energy density - a small amount produces a lot of energy
- Can be used domestically and industrially
- Easily available

Disadvantages

- Burning causes air pollution and greenhouse gases
- Highly flammable
- Spills can be very bad for wildlife
- Exhaustive supply
- Volatile import market, making it more expensive

Coal

What is it?

Formed from plants that have absorbed the suns energy, which has been pressurised over millions of years, into a sedimentary, burnable rock.

Advantages

- Reasonably cheap to mine
- Inexpensive to convert coal into energy
- Plentiful in many places
- Easy and safe to store

Disadvantages

- Impact on the environment from mining
- A major source of air pollution and greenhouse gas emissions when burnt
- As well as carbon monoxide and heavy metals like mercury, burning coal releases sulphur dioxide which is linked to acid rain
- Dirty to handle

Peat

What is it?

Peat is a type of soil and contains energy that the plants locked within it created using photosynthesis.

Advantages

- Can be found almost everywhere on earth
- Can be used domestically and industrially
- Can be used in different forms including milled and briquettes

Disadvantages

- The most harmful fuel as it produces higher CO_2 emissions per unit
- Peatlands store a third of the world's soil carbon, released on burning
- Easily ignites, allowing wildfires to spread
- Cutting peat destroys habitats and impacts environmental processes such as water management