

Renewable energy

Summary:

- * The sun is the source of most of our energy
- * Energy use and appliance power ratings
- * Payback times and cost savings
- * Comparing renewable and conventional fuels
- * Motivations for using renewable energy technologies
- * Climate change impacts
- * Green energy tariffs
- * Energy efficiency

Energy from the sun

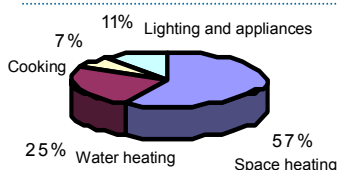
Most of the renewable technologies we will look at stem from solar energy either directly or indirectly.

D i r e c t
Photovoltaic, solar water heating, ground source heat pumps.

I n d i r e c t
Biomass, wind, hydro power.

Other sources
Tidal, geothermal.

The energy we use in our homes



The energy we use in our homes can be broken down into a number of areas: **Space heating**, the energy used to keep our homes

warm and comfortable. **Domestic hot water**, for showering and washing dishes. Lighting and appliances. Cooking.

What is a kilowatt hour?

A kilowatt hour is the unit used by gas and electricity companies to measure the amount of energy we use in our homes.

A one-bar electrical fire uses about 1kWh of energy each hour it is switched on.

A 100watt light bulb uses 1kWh of energy when it is switched on for 10 hours.

An energy efficient light bulb provides the same amount of light but uses 1/5 of the energy.

We talk about the **amount of energy** used (or generated) in kWh.

While appliances have a **power rating** in kW.

The term **payback time** is often used when discussing renewable energy technologies.

However, it is also worth noting the total **cost savings** and yearly savings.

Size of property	Annual energy demand (kWh)	
	Domestic hot water	Space heating
Two-bed terrace	2,000	10,000
Three-bed semi detached	2,500	13,800
Four-bed detached	3,000	21,200

In addition we use about 3000kWh – 6000kWh of electricity to run appliances and lighting.

Comparing conventional and renewable energy

Running costs - generally renewable energy technologies have lower, or virtually no running costs. There will be some maintenance costs for systems and fuel costs for biomass boilers.

Carbon neutral - this means that they don't produce carbon dioxide or that any carbon dioxide produced, for example in wood fuels, is reabsorbed by new trees being planted.

Local economy - there is a knock on benefit to the local economy. For example, using wood fuels produced locally will put money back into the local economy and will create jobs.

Intermittency - the sun doesn't always shine and the wind doesn't always blow.

Storage - there may be a need for a backup or to

store some of the power for use later.

Resource assessment - the fact that the wind doesn't always blow or water levels can drop in rivers, also means that it is not always straight forward to assess the potential for renewables.



NOTES

Motivations for using renewable energy

Oil is a **finite resource** because there is only so much of it on the earth.

It is thought that we have now discovered most of the oil fields on the planet.

Global demand is soaring. We rely primarily on fossil fuels for our food, our transportation, our heating, our lighting and all our electronic gadgetry.

Because of the energy required to produce any good or service, we need energy prices to remain low in order for all other prices to remain low.

With **oil depletion**, energy prices will rise as supply fails to keep up with rampant demand.

There is a growing consensus from scientists and the oil industry that we are going to reach **peak oil** in the next twenty years, and that we might have reached this point already.

Where you find oil has a big impact on ensuring a dependable supply. Political instability, commercial instability and conflict threaten our **security of supply**.

In the end, supply and demand will all be balanced by cost.

Global demand is soaring, whilst global production is declining, and oil is set to become **increasingly expensive** and scarce.

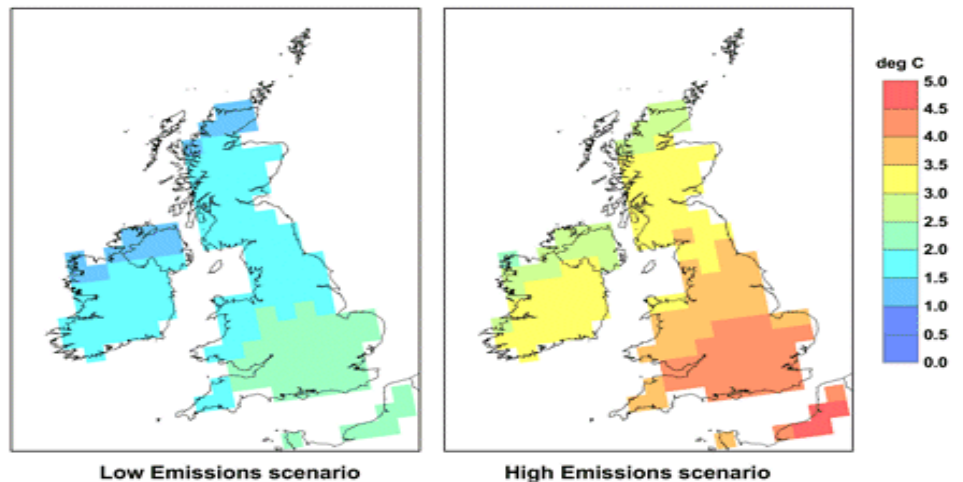
Since the industrial revolution began around 200 years ago, people have been burning more fossil fuels, which has pumped large quantities of **greenhouse gases** into the atmosphere.

The majority of scientist believe that this has resulted in an increase in the earth's temperature (**Global warming**) which will cause our climate to change.

Climate change can manifest itself in a number of ways; for example, changes in regional and global temperatures, changes in rainfall patterns, expansion and contraction of ice sheets and sea-level variations.

What does climate change mean for us?

Change in annual average daily temperature



In general for the UK, climate change means hotter, drier summers (more heat waves), milder wetter winters, higher sea levels and an increased flood risk to coastal areas.

Sometimes people think that climate change will be a positive thing, giving us warmer summers and fewer cold winters. However, the overall cost to society, the environment, our health and the econ-

omy is likely to far outweigh any benefits.

The whole of human society operates on knowing the future, particularly the weather.

Our houses are built for the local climate – in the UK that means central heating but no air conditioning. While in the southern USA it is vice versa. Roads, railways, airports, offices, cars, trains, etc. are

all designed for the local climate.

The problem with global warming and the resulting climate change is that it changes the rules. The past weather of an area cannot be relied upon to tell you what the future will hold.

NOTES

Reducing carbon dioxide emissions

The energy we use to heat, light and power our homes produces 23% of carbon dioxide emissions. Another 23% comes from road transport. There is therefore a significant amount directly under our control.

The average household creates around six tonnes of carbon dioxide every year.

There are simple steps you can take to cut carbon dioxide emissions and help prevent climate change.

Making your home more energy efficient can save around two tonnes of carbon dioxide a year and potentially hundreds of pounds on your household bills.

Green energy tariffs

One of the simplest ways to contribute to the use of renewable technologies is to switch to a renewable energy electricity tariff.

Most electricity suppliers offer a green tariff. Often it will not cost any more than the standard tariff you are already on.

They match your electricity need by purchasing an equivalent amount of renewable power from wind farms or hydropower dams.

Energy efficiency

There is no point spending money installing a renewable energy technology if your home is not energy efficient. You will just waste any energy you produce.

There are sometimes grants available for energy efficiency measures so before you start its worth contacting the Energy Saving Trust on 0800 512 012.



Home improvements that save money and the environment

Cavity wall insulation is one of the most cost-effective measures available.

Loft insulation. The current minimum standard is 200mm or 8 inches. You can go beyond minimum standards for even greater comfort.

Draught proofing. All houses need a certain amount of controllable ventilation. However, excessive ventilation in the form of draughts can be dealt with easily through draught proofing.

Double glazing. Not only will this reduce heat loss, it will also reduce noise while possibly increasing the value and safety of your home.

All **white goods** (fridge, freezer, boiler, washing machine, dish washer etc..)

are sold with an energy efficient rating. When changing appliances, purchase the model with the highest rating. It may cost a bit more at the outset but will save you money in the long run.

Energy efficient **bulbs** are well worth considering especially where lights are likely to be left on for long periods. They use about 1/5 of the electricity of conventional bulbs and last up to twelve times longer.

The type of **boiler** you install can have a major impact on the amount of fuel you use. A condensing gas boiler is more efficient using up to a 1/3 less fuel. Replacing a 15-year-old boiler could save you over 20% on your fuel bills, around 32% if you install a condensing boiler and up to 40% if you install the right heating controls as well.

A **programmable timer** is probably the most useful heating control as it automatically controls the times at which the central heating and hot water systems are switched on and off.

A **room thermostat** automatically switches your heating off once it reaches your chosen temperature and back on again if it drops below a preset comfort level.

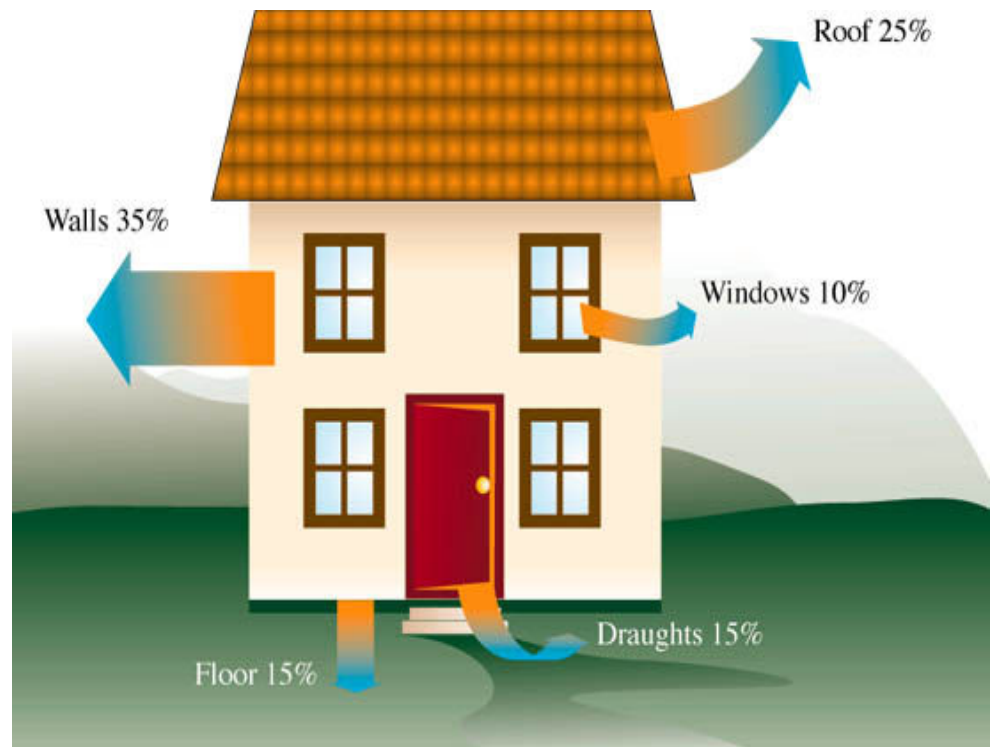
Thermostatic radiator valves (TRV) control individual radiators.

A **cylinder thermostat** is normally set to 60°C. If it is higher than this you are wasting energy. If it is much lower, then bacteria in the water may survive.

NOTES

Energy efficiency without spending a penny

- Always turn off the lights when you leave a room
- Regularly defrost fridges and freezers
- Close curtains at dusk
- Just heat the amount of water you need in your kettle
- Use the right size of pan for cooking
- Don't block radiators with furniture
- Do not leave TV etc. on standby, as it is still using $\frac{1}{4}$ of the electricity
- Full loads in washing machines and dishwashers
- Showers rather than baths
- Put the plug in – never leave water running



More information

Energy Saving Trust (EST) advice centre
 Tel: 0800 512 012
www.energysavingtrust.org.uk

The Low Carbon Buildings Programme
www.lowcarbonbuildings.org.uk

The Association for the Study of Peak Oil
www.peakoil.net/