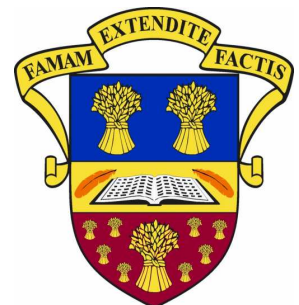


Energy



Name _____
Class _____
Teacher _____



Ellon Academy
Technical Faculty

Learning Intentions

- o To know about the different types of energy
- o To know what energy is
- o To know the 3 main areas of energy
- o To learn what a fossil fuel is and its advantages and disadvantages
- o To know about Energy transfers
- o To know about Energy Audits

Success Criteria

- o I can understand why the sun is the ultimate source of energy
- o I can give examples of biosphere, renewable and radioactive energy sources
- o I can understand the need for alternative energy sources
- o I can Describe, using the systems approach, how some engineered objects work
- o Using my previous knowledge of sub-systems I can now describing the function of each part and how they interact
- o I am able to debate the possible future impact of new and emerging technologies on economic prosperity and the environment.
- o I am able to discuss possible lifetime costs of the environment in Scotland and Beyond
- o I can create a basic Energy Audit show all waste energy

To access video clips that will help on this course go to www.youtube.com/MacBeathsTech



What is Energy?

Energy is all around us and that it comes in many forms. 'Energy is the ability to do work.'

Energy can be converted from one form to another, but it CANNOT be destroyed.

Listed below are the main forms of energy:

Sound	Heat	Light
Electrical	Chemical	Nuclear
Field (Magnetic)	Kinetic (movement)	Potential (stored)

Where does it come from?

All the energy in the food we eat comes originally from the sun. This means the sun is the **ULTIMATE** source of energy in food. In fact, all fuels and energy sources come from the sun in some way.

There are 3 main areas in which the sun's energy is found on earth:

- Biosphere fuels
- Renewable Energy
- Nuclear Fuels

Biosphere Fuels

Photosynthesis is where plants make chemical compounds that store a lot of energy and can be made available to the Earth's living system or biosphere. Fossil fuels also store the sun's energy because they are made from materials that were once living. They too are biosphere fuels.

Renewable fuels

We can capture the sun's energy every day through the use of solar collectors (panels) wind turbines, wave and tidal power stations. This type of fuel can be used over and over again as long as the sun shines and the Earth is still alive. This is also known as 'alternative Energy'. With technological advancements, this is becoming more widely used, with Scotland quickly becoming one of the world leaders.

Nuclear Fuels

This energy comes from the 'Big Bang' when radioactive atoms were left behind. Uranium is mined and is ideal to use as an energy source as a huge amount of energy can be created from a small amount of ore. The Nuclear power station splits the uranium atoms to speed up the decay process and capture the energy. This is known as Nuclear Fission. The heat produced is used to produce steam, which in turn is used to turn a generator and produce Electricity.

This is a very dangerous method to get energy though and creates a lot of extremely dangerous waste.

What is a fossil Fuel?

Fossil Fuels hold a great deal of stored energy.

Coal and peat are made when plants die in a watery environment and are compressed over millions of years.

Oil is made when animals and plants have died and settled on the sea bed and have been compressed over millions of years. Before it can be used it is put through a refinery to break it down into more useful components. These include Petrol, Diesel, Oil for lubrication, Paraffin Oil and Oil to make plastics. Before it has been through this process it is known as crude oil.

Natural Gas is produced when the oil decays.

The Greenhouse Effect

One major drawback of using fossil fuels is something called the Greenhouse Effect.

Task 1

Use the internet to research and make an A3 poster with information about the 'green house effect.'

Helpful hints;

What is it?

How does it happen?

What does it look like?

What can we do to stop it?

How does it affect global warming?

What is acid rain?

Conservation of Resources

The best way to put fewer greenhouse gases and acid rain gases into the atmosphere and to save the fuels we have left is to use and waste less energy.

Our industrial society has also been very wasteful with energy over the years and there are many ways in which we can improve.

If we use more energy efficient methods, we could save $\frac{3}{4}$ of all energy we use in our homes, offices, factories and transport.

Energy saving is something that can be easily done, for example, switching unneeded electrical items off over night, or at least putting them on Standby mode. If every Sky Box in the UK was turned onto stand by over night for a year, the amount of energy saved would be enough to power Birmingham for a whole year.

Task 2

In pairs use the internet to research and make up a PowerPoint of a selected form of Renewable Energy given by your teacher. This PowerPoint will then be presented to the class.

Helpful hints:

What is it?

How does it happen?

What does it look like?

Where is it used?

What are its advantages?

What are its disadvantages?

How are engineers using it in the modern world?

What engineers are involved in its implementation?



<http://www.youtube.com/watch?v=I9tI6YJzsE>

Task 3

1. Complete the following sentence by using the list of phrases given.

Greater than

less than

equal to

"The efficiency of all machines will be 100% because the input energy is always _____ the output energy"

2. Oil is a non-renewable fuel source.

State two other examples of non-renewable fuel.

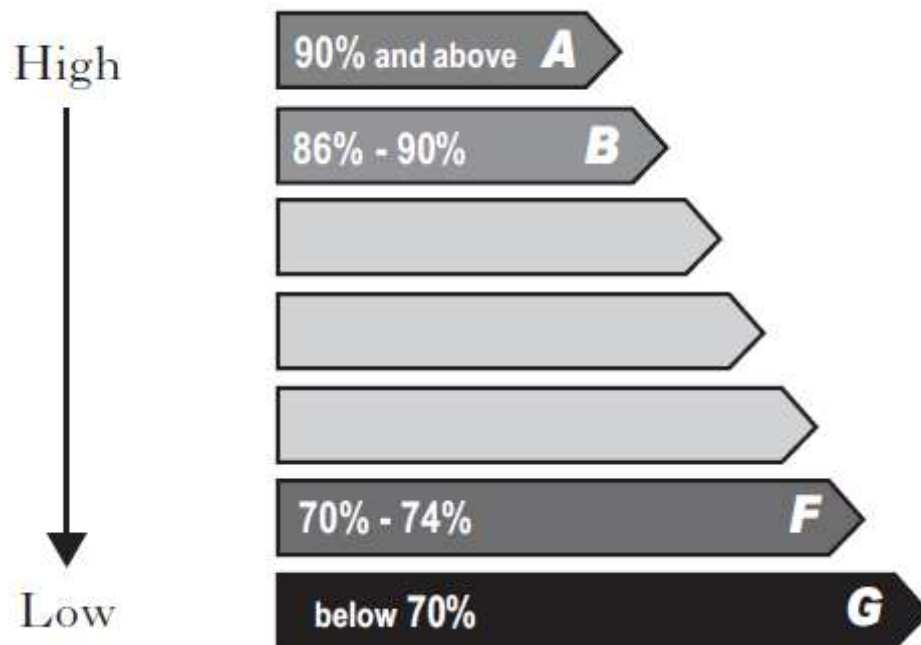
3. Describe 2 ways in which solar panels can contribute to tackling climate change.

4. Explain what happens to crude oil at a refinery. Name some products created in this process.

Task 4

Modern fridges are graded for their energy efficiency as shown below.

Efficiency



(a) Describe **two** ways in which a fridge could be made more energy efficient.

(b) (i) State **one renewable** energy source that could be used to produce electricity.

(c) Other than cost, state one disadvantage of using this form of energy

Task 5

Choose any 2 DIFFERENT engineered objects from your house

(a) Identify all the inputs and outputs of the system, and draw a system diagram to show this.

(b) Identify at least three sub-systems, and produce a more detailed system diagram showing these sub-systems. Include any feedback loops in your diagram.

Task 5 (continued)

(c) Produce a description of how the object works, referring to each of the sub-systems, and the role of feedback in the system.

Object 1

Object 2

Task 5 (continued)

(d) Carry out an energy audit, identifying all energy transformations within the system, and the main energy losses from the system.

Task 6

A crofter uses a wind power system to pump water to a storage tank.



Wind is a renewable source of energy.

(a) (i) Complete the table below to show the nature of the given energy sources.

Energy Source	Renewable	Finite
Wind	✓	
Gas		
Solar		
Biomass		

(ii) State a **disadvantage** in the use of tidal energy.

Task 7

1. An environmentally friendly racing car has been made.



As the car slows its kinetic energy reduces. Explain what happens to this kinetic energy.

Task 8

Solar power is increasingly being used as an alternative source of energy in place of fossil fuels.

(a) Describe **one** advantage and **one** disadvantage of using solar power.

Advantage

Disadvantage

(b) Describe **one** reason why fossil fuels are still being used.

(c) Describe **two** reasons why systems should be made as efficient as possible.