2-3 Renewable Energy

Main Reading text

Most of the energy we use today comes from oil or gas, and is **finite**. That means there is only a fixed amount and when it's finished, there is no more. It is true that we are finding new supplies of oil and gas, and new ways of **extracting** it from ever more difficult places. Of course we can also do many things to stop **running out** soon, such turning off lights we don't need, leaving our cars and motorbikes at home and taking the bus, or even better cycling. But whatever we do and however careful we are there will come a time when there is simply no more oil or gas. We already have electric bikes and some companies are developing electric cars. But for these to work we need electricity, and where does that come from?

In the previous article we looked at nuclear power as a source of energy, but what we didn't mention is that it is very expensive at the moment to develop and run nuclear power stations. Plus many people, rightly or wrongly, do not want to use nuclear power as they think it is too dangerous. Plus, the process of producing oil, coal, or natural gas fuel is a difficult and demanding process that requires a great deal of complex equipment, and complex physical and chemical processes. On the other hand, renewable energy can be easily produced with basic equipment and simple processes.

So what are the **alternative** renewable energy sources? In fact there are many alternatives, but each one has its own difficulties and problems.

Renewable energy is taken from natural resources, such as sunlight, wind, **ocean tides**, rivers, wood and **geothermal** heat, all of which are produce by natural processes. Let's look first at wind turbines. Do you remember turbines from the previous article? Turbines are the machines that rotate and generate electricity. In fact there is a simple form of turbine in every motorbike, car, truck and bus, etc. Wind turbines seem to be a good idea. They work without causing pollution, they are relatively quiet and with modern technology they are quite efficient. So what are the problems and benefits?

Well, they have to be in a windy places such as hills coasts and open flat lands. There also need to be many of them if they are going to make a good contribution to the electricity supply. Windy places are usually beautiful places that people like to visit, like mountains and the coast. Consequently many people think wind farms, as they are called, are ugly and spoil the view and they do not want to see them. Also wind farms only produce electricity if there is wind to turn the turbines. On days without wing they are no use. However, there is a wind farm **off-shore** near Copenhagen, the capital of Denmark, and as there is almost always a wind over the sea, this is a very efficient wind farm. Another problem with wind farms is that birds do not understand about lots of large blades turning and many birds are killed as they try to fly though the wind farms.

In favor of wind farms is that they are quiet, there is no pollution, no greenhouse gasses, and with suitable storage the electricity they generate can

be available more-or-less continuously. Now we shall turn our attention to sunlight. The sun will always be with us, well at least for another 5 billion years, or so. In its simplest form, energy from the sun, known as 'solar' energy, can be used to heat water by putting a container full of water out in the sunlight. This is the basis of the solar heating that you can see on the roofs of many houses. The sunlight heats the water, which is then pumped around the house to keep it warm and to provide warm water for washing. In regions where the sun is high in the sky for most of the day, they can provide from 60 to 70% of the domestic hot water a family will need, at temperatures up to 60 °C.

There are also solar panels which can convert sunlight into electricity. These are called '**photovoltaic** cells' or PV cells and can be fitted to the roof of your house and can supply enough electricity to run your home. They are rather more expensive than solar water heating at the moment, but the cost is coming down as more people buy them. Some regions have large PV farms; **especially** in regions with a lot of sunlight per year, such as California and Spain.

But electricity for homes is not the only use for PV panels, there are solar powered cars, airplanes, boats, and many small industrial applications. But, in a similar way to wind power, PV cells only work wen there is sunlight, which means that on cloudy days they are very inefficient, and at night they do not work at all.

Finally let's consider hydroelectric power. First a large wall is built in a suitable place, usually a valley, to stop the water flowing down a river. This creates a vast lake, known as a 'damn'. Within the damn wall are a number of turbines that rotate as the water flows through. The rotating turbines generate electricity. The flow of water can be controlled and thus the amount of electricity generated can be controlled. This **flexibility** is very useful since electricity production can be increased and decreased very quickly to **adapt** to changing energy demands. The cost of hydroelectricity is relatively low, making it a **competitive** source of renewable electricity. Once a hydroelectric **complex** is constructed, it produces no direct waste, and has a considerably lower **output** level of the greenhouse gas carbon dioxide than fossil fuel powered energy plants. This form of renewable energy has been with us for a long time, and although it is renewable because it works with water, it can be quite damaging to the local environment. Sometimes whole towns are destroyed and wild life damaged. There are several other forms of renewable energy, such as biofuels, geothermal energy, wave energy and wood. Wood is probably the most environmentally friendly renewable energy source we have. All we need to do is plant lots of fast-growing trees. But I can't see that happening as long as we want to continue eating burgers.

Vocabulary

1. **FINITE (adj)** 有限的

   Having limits. Limited

   A finite number of possibilities. The earth's finite supply of natural resources

2. **EXTRACT (v)** 提煉

   To remove something by pulling it out or cutting it out.

   The painful tooth was carefully was extracted.

3. **TO RUN OUT (v)** 耗盡

   To have nothing left. To use up everything.

   The car stopped because it had run out of fuel/

4. **PROCESS (n)** 過程

   A series of actions that produce something or that lead to a particular result.

   We're decorating our house. The whole process will take a few months.

5. **COMPLEX (adj)** 複雜的

   a. A group of buildings that are located near each other and used for a particular purpose.

      An apartment complex. A sports complex.

   b. A group of things, or machines, that are connected in complicated ways.

      A network system is a complex of many computers.

6. **ALTERNATIVE (adj)** 代替的

   A choice between similar things.

   An alternative newspaper.

7. **RENEWABLE (adj)** 可更新的

   Of something able to be extended for another time period. Able to be renewed.

   Forests are renewable natural resources, but they must be treated with care.

8. **OCEAN TIDES (n)** 海洋潮汐

The regular rise and fall of the sea level. This is due the effects of the moon and sun and there are two tides each day, separated by around every 12 hours and 24 minutes.

9. **GEOTHERMAL (adj)** 地熱的

Of, or relating to, or using the natural heat produced inside the Earth.

10. **SPOIL (v)** 損壞

a. To have a bad effect on something. to damage or ruin something.

The camping trip was spoiled by bad weather.

b. To give someone, such as a child, everything that he or she wants.

She always spoils me on my birthday.

11. **OFF-SHORE (adv)** 近海岸地

a. At a distance from the shore, may be far or quite near to the shore (coast/beach).

My cousin works on an off-shore oil platform.

b. Moving away from the shore toward the water,

A gentle off-shore wind.

12. **EFFICIENT (adj)** 效率高的

Able to produce the desired results without wasting materials, time, or energy

An efficient worker.

13. **SUITABLE (adj)** 合適的

Having the qualities that are right, needed, or appropriate for something.

We upgraded the computer to make it suitable to our needs.

14. **PHOTOVOLTAIC (adj)** 光電的

Of something that generates electricity from sunlight or a similar type of energy.

15. **ESPECIALLY (adv)** 尤其

a . More than usually. Used to indicate something that deserves special mention.

I made this pie especially for you.

b. For a particular purpose.

A Ferrari is built especially for speed.

16. **HYDROELECTRIC (adj)** 水力發電的

Of something that use the power of moving water to generate electricity.

17. **VAST (adj)** 寬闊的

a. Very great in size, amount, area etc.

A vast knowledge of literature. A vast expanse of desert.

18. **FLEXIBILITY (n)** 彈性；適應性

Capable of changing easily. Able to change or to do different things.

A flexible schedule 19. ADAPT

To change behavior/actions so that it is easier to live/work in a particular place or situation.

The camera has been adapted for underwater use.

The clock was adapted to run on batteries.

20. **COMPETITIVE (adj)** 競爭的

As good as or better than others of the same kind. Able to compete successfully with others.

You need a degree to be competitive in today's job market.

21. **OUTPUT (n)** 產量

Something, such as power, energy, or information, that is produced by a machine or system.

The computer's output is shown on this screen

22. **BIOFUELS (n)** 生化燃料

A fuel such as wood or ethanol (a type of alcohol that is fuel for car engines) that is produced from biological materials; as compared to fossil fuels such as coal gas and oil.

23. **WAVE (v)** 震動；波動

An area of moving water that rises and falls above the main surface of an ocean or lake. Storm waves are very big. The waves crashed onto the rocks.

24. **AS LONG AS (ph)** 只要；既然

If things stay the same. Used to give the idea of doing something before something else changes.

As long as I've got my boots on, I might as well go out and get the firewood.

I will wait here as long as its raining.

Review exercise

Choose to best word or phrase to complete the following sentences based on the text.

1. We are finding new ways of _____ oil and gas from difficult places.

(A. bringing B. giving C. putting D. extracting)

2. At the moment, nuclear power stations are very _____ to operate.

(A. difficult B. expensive C. economic D. easy)

3. The process of producing fuel from oil is a difficult and _____ process.

(A. dangerous B. demanding C. careful D. chemical)

4. It requires a great deal of _____ equipment.

(A. complex B. dangerous C. demanding D. difficult)

5. So what are the alternative _____ energy sources?

(A. bigger B. made C. renewable D. bought)

6. Wind turbines work without causing _____.

(A. noisy B. difficulty C. electricity D. pollution)

7. Off-shore wind farms are usually very _____.

(A. efficient B. near the beach C. difficult D. pleasant to see)

8. There are also solar panels which can _____ sunlight into electricity.

(A. reflect B. convert C. give D. reproduce)

9. A _____ place for building a damn is usually in a valley.

(A. dangerous B. controlled C. suitable D. vast lake)

10. Sometimes whole towns are _____ and wild life damaged.

(A. ended B. rebuilt C. destroyed D. removed)

True or False

1. Most of the energy we use to day is finite. T/F
2. Taking public transport is a less efficient way to use the world's oil. T/F
3. Many people think that nuclear power is too dangerous to use. T/F
4. In reality, there are only one or two alternative renewable energy sources. T/F
5. Wind turbines can provide electricity continuously. T/F
6. Wind farms are pollution-free. T/F
7. Photovoltaic (PV) panels are too big to be fitted to the roof of an ordinary house. T/F
8. Photovoltaic (PV) panels are used in some airplanes. T/F

9. The cost of electricity from a hydroelectricity damn is relatively high. T/F

10. Wood is probably the most environmentally friendly renewable energy source we have. T/F

Reading Comprehension - choose the best answer

1. ( )We need to consider looking for different sources of energy for the future because,

   a. The cost of oil, gas and coal is too high, therefore we need to find cheaper alternatives.

   b. Most of the energy sources we are using at the moment will soon run out and we are not careful future generations will have very little fuel for energy.

   c. Many people think that the power companies are making too much profit and therefore we should all have our own way of creating electricity and heat.

   d. it is not true that we should consider looking for different sources of energy for the future because there is enough power at the moment, especially with hydroelectric damns.

2. ( ) Wind farms, consisting of many wind turbines are the only possible form of energy creation for the future because.

   a. This is not true because there are many forms of renewable energy, some of which cause less damage to the environment and wild life.

   b. They are cheap to build, they do not create any pollution, they are efficient, and they make electricity all the time.

   c. Even though some people think they are ugly, we still need to build them as long as we can not find any more oil, coal or gas.

   d. They are so efficient and quiet than only a few are needed to supply all the electricity for a city.

3. ( ) Photovoltaic (PV) cells are the best way forward in terms of generating electricity because they use sunlight, which will be there for ever, or at least for a very, very long time.

a. It is true that the sun will be with us for almost ever, so it makes sense to use PV cells to use its light to create electricity and warm water.

b. PV cells may be useful for small areas, such as the roofs of houses, but to be economic they will have to cover large areas of land, and this land would be better used to produce food.

c. PV cells may be good at generating electricity, but the can cause a lot of harm to the environment. Another problem is that birds do not understand about PV cells and many birds are killed as they try to fly though the wind farms.

d. While it is true that the sun will provide the earth with energy for millions of years, PV cells are rather expensive at the moment and only work well in regions with a lot of sunlight. However, if the weather