

# 15 The green revolution

## The environment, climate change and pollution



### The environment

**1.1** Choose the words that reflect your opinion of these three statements from the first column of the table below. Write the words you chose in the *My opinion* column.

- We should educate the public about our environment by handing out leaflets.
- Within a few years we will have solved all of our pollution problems.
- Within the next ten years the only chemicals we use will be environmentally friendly ones.

	<i>My opinion</i>	<i>Speaker A</i>	<i>Speaker B</i>
Statement 1 – useful / useless?			
Statement 2 – possible / impossible?			
Statement 3 – likely / unlikely?			

**1.2** 15a Now listen to two people (speakers A and B) giving their opinions about the same ideas and choose the words that reflect their opinions. Write them in the appropriate columns of the table.

**1.3** Listen again or look at the recording script at the back of the book and write the adjectives the speakers used to express their opinions. Put the adjectives into the correct column according to their meaning.

useful

useless

possible

impossible

likely

unlikely

beneficial

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### Vocabulary note

The prefix *re-* often tells us that something is being done again: *reuse*, *revegetate*.

The prefix *de-* often tells us that something is being removed: *decaffeinated*, *deforestation*.

### Climate change and pollution

**2.1** Complete the text with words from the box.

acid biodiversity contaminated deforestation ecosystems emissions  
environmental erosion exhaust drought fertilisers greenhouse waste

The advances made by humans have made us the dominant species on our planet. However, several eminent scientists are concerned that we have become too successful, that our way of life is putting an **unprecedented** strain on the Earth's (1)..... and threatening our future as a species. We are confronting (2)..... problems that are more **taxing**

than ever before, some of them seemingly **insoluble**. Many of the Earth's crises are **chronic** and **inexorably** linked. Pollution is an obvious example of this, affecting our air, water and soil.

The air is polluted by (3)..... produced by cars and industry. Through (4)..... rain and (5)..... gases these same (6)..... fumes can have a **devastating** impact on our climate. Climate change is arguably the greatest environmental challenge facing our planet with increased storms, floods, (7)..... and species losses predicted. This will **inevitably** have a negative impact on (8)..... and thus our ecosystem.

The soil is (9)..... by factories and power stations, which can leave heavy metals in the soil. Other human activities such as the overdevelopment of land and the clearing of trees also take their toll on the quality of our soil; (10)..... has been shown to cause soil (11)..... . Certain farming practices can also pollute the land though the use of chemical pesticides and (12)..... . This contamination in turn affects our rivers and waterways and damages life there. The chemicals enter our food chain, moving from fish to mammals to us. Our crops are also grown on land that is far from **pristine**. Affected species include the polar bear, so not even the Arctic is **immune**.

Reducing (13)..... and clearing up pollution costs money. Yet it is our quest for wealth that generates so much of the refuse. There is an urgent need to find a way of life that is less damaging to the Earth. This is not easy, but it is **vital**, because pollution is **pervasive** and often life-threatening.

## 2.2 Match the words in bold with these synonyms.

- |                                   |                          |
|-----------------------------------|--------------------------|
| 1 unspoiled <u>pristine</u> ..... | 6 unaffected .....       |
| 2 crucial .....                   | 7 omnipresent .....      |
| 3 unparalleled .....              | 8 unavoidably (x2) ..... |
| 4 extremely harmful .....         | 9 persistent .....       |
| 5 insurmountable .....            | 10 challenging .....     |

## 3 Consider how you would answer these questions.

- What do you think is the greatest environmental threat we face today?
- What can the government do to help protect the environment?
- What can we as individuals do?

## 4.1 Use a dictionary to check the different forms of the words in the box as well as the prepositions used with them. Then complete the answers to the questions in 3 using the correct form of the word in brackets. You will need to add prepositions to the words that are underlined.

contaminate   danger   dispose   erode   pollute   recycle   risk   sustain   threat

- I think our environment is <sup>1</sup> under threat from (**threat**) many different things. We have allowed too much <sup>2</sup> ..... (**pollute**) to enter our ecosystem and we are <sup>3</sup> ..... (**danger**) poisoning ourselves as a result. I think soil <sup>4</sup> ..... (**erode**) and water <sup>5</sup> ..... (**contaminate**) are two of the most urgent problems that we need to deal with.
- Clearly our current lifestyle is not <sup>6</sup> ..... (**sustain**). The government should educate people about these problems and encourage us to change our habits. They need to show everyone that we are putting the very future of our planet <sup>7</sup> ..... (**risk**).
- We can make sure we don't throw <sup>8</sup> ..... (**recycle**) items into our normal waste <sup>9</sup> ..... (**dispose**) bins. We can also help protect our planet by not using phosphate-based detergents; this will help to keep <sup>10</sup> ..... (**pollute**) out of our food chain.

## 4.2 Complete the sentences using the negative form of the words in brackets.

- It is unrealistic (*realistic*) to expect everyone to change their buying habits overnight.
- When it comes to protecting the environment, cost should be ..... (*relevant*).
- It is ..... (*reasonable*) for rich countries to expect developing countries to reduce carbon emissions immediately.
- People who dump chemical waste into our waterways are very ..... (*responsible*).
- The oil spill has caused ..... (*repairable*) damage to several marine species.
- Scientists believe that the damage to this area is ..... (*reversible*).
- These species are ..... (*replaceable*). Once they are lost our ecosystem will be changed.
- It is a mistake to think that increased consumerism and environmental damage are ..... (*related*).



### Vocabulary note

The prefix *ir-* is often used with adjectives beginning with *r* to form the opposite or to mean lacking something: *reversible*, ***irreversible***, *regular*, ***irregular***. Some words beginning with *r* form their opposite with *un-*: *realistic*, *unrealistic*.

## 4.3 Spend 2 minutes speaking about the topic below. When you have finished, complete the writing task. For both tasks, try to use as many of the new words you have learned in this unit as you can.

**Describe something that you often do to help the environment.**

**You should say**

- what you do
- why you think this helps the environment
- what other things you would like to do to help

**and say how you feel about helping the environment.**

**Your city council has asked for suggestions of ways that locals can help the environment.**

**Write a letter to the council. In your letter**

- suggest a way that locals and the council can help the environment
- explain why you think this would help the environment
- say why you think it is important to help the environment

Write at least 150 words

Begin your letter as follows:

**Dear Sir or Madam,**

## 5 PRONUNCIATION 15b Some words have a different stress pattern and therefore a different pronunciation, depending on their meaning or part of speech. Circle the correct stress pattern for the words in *italics* in these sentences. Listen to the recording to check your answers and then practise saying the sentences.

- I *refuse* to go. (refuse / refuse)
- Disposing of *refuse* is a growing problem. (refuse / refuse)
- There is a *conflict* here. (conflict / conflict)
- The two reports *conflict* with each other. (conflict / conflict)
- We all need to be *present* at the meeting. (present / present)
- This issue *presents* an enormous problem. (presents / presents)
- We are making a lot of *progress*. (progress / progress)
- We need to *progress* at a faster rate. (progress / progress)
- There has been an *increase* in carbon emissions. (increase / increase)
- Temperatures are expected to *increase*. (increase / increase)

# Test practice

## Academic Writing Task 1

### Test tip



Make sure that you include all of the stages in the process. You should follow a logical sequence and do not miss any stages out. Do not copy words directly from the question paper; instead try to change them. For example, you could use the verb *collect* instead of the noun *collection*. Study the information in unit 23 before you begin.

You should spend about 20 minutes on this task.

The diagram below shows the process for recycling of aluminium cans.

Summarise the information by selecting and reporting the main features, and make comparisons where relevant.

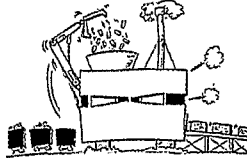
Write at least 150 words.

Figure 1



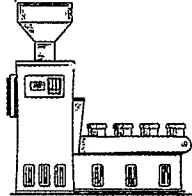
Collection

Figure 2



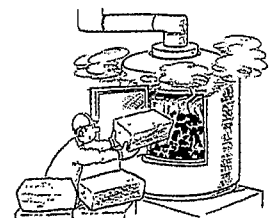
Cleaning, sorting,  
shredding and  
compression

Figure 3



shredding and  
compressing

Figure 4



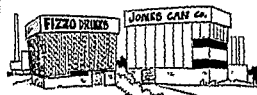
Heating

Figure 8



Reusing  
Number recycled:  
74% (UK)

Figure 7



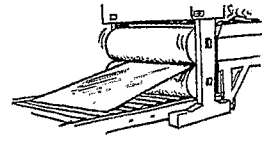
Recycling

Figure 6



Delivering

Figure 5



Rolling  
2.5 mm–6 mm thick

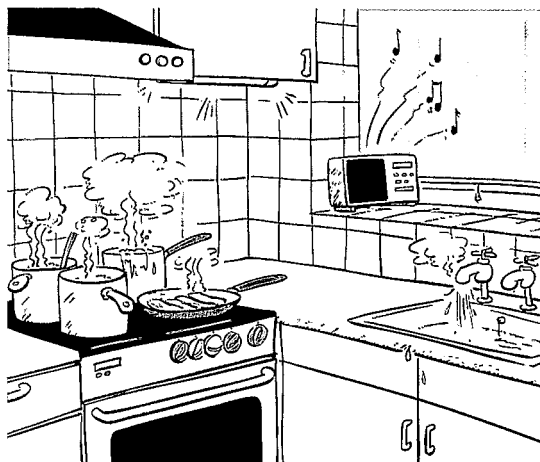
# 16 The energy crisis

## Natural resources, alternative fuels

### Natural resources

#### 1.1 Answer the questions in this quiz.

- 1 You decide to fly to an island 5,000 miles away for a holiday. How many trees would you need to plant to offset or make up for the CO<sub>2</sub> emissions produced by the flight?  
A 0.2                      B 20                      C 2
- 2 Which is the most environmentally friendly way to clean your clothes?  
A Hand-wash the clothes in hot water.  
B Take them to the dry cleaners.  
C Machine-wash the clothes in cold water.
- 3 You are tidying up your house in the evening, going back and forth between the bedroom, kitchen and living room, spending five to ten minutes in each room as you sort out the clutter. What is the best way to make sure your lights aren't needlessly wasting energy?  
A Keep the lights on as you go from room to room until the job is done.  
B Turn the lights off every time you leave a room and then on again when you return.
- 4 You decide to cook a baked potato for lunch. Which is the most energy-efficient way of cooking the potato?  
A Put it in an electric oven to cook slowly for an hour.  
B Quickly zap it in the microwave.
- 5 You want to really make a significant contribution to the reduction of CO<sub>2</sub> emissions. Which of these would be of the most benefit over the course of a year?  
A Taking the train instead of driving a car.  
B Hanging your washing out to dry rather than using the tumble dryer.  
C Working from home one day a week.



#### 1.2 16 Listen to the answers to find out how environmentally aware you are.

#### 1.3 Complete the text with one word in each gap. Then look at the recording script at the back of the book to check your answers.

If we want to (1)..... energy then we need to change the way we behave. We need to buy appliances that are more energy (2)..... and limit the amount of time we use them. To reduce the (3)..... the greenhouse gases have on our (4)..... we should plant more trees. Trees can (5)..... carbon dioxide and so they help to (6)..... the fumes produced by our cars. Turning off lights even for a few minutes can (7)..... the negative effects of turning them on again later.

**2.1** Read the text and then answer the questions below.**The future of energy**

CO<sub>2</sub> plays a critical role in maintaining the balance in the Earth's atmosphere and the air that we breathe. It is also a waste product of the fossil fuels that almost every person on the planet uses for transport and other energy requirements. Because we create CO<sub>2</sub> every time we drive a car, cook a meal or turn on a light, and because the gas lasts around a century in the atmosphere, the proportion of CO<sub>2</sub> in the atmosphere is rapidly increasing.

The best evidence indicates that we need to reduce carbon dioxide emissions by up to 70 per cent by 2050. If you own a four-wheel-drive car and replace it with a hybrid car – a car that is powered by a combination of electricity and petrol – or a smaller standard-fuel car, you can achieve a reduction of that magnitude in a day rather than half a century. Unfortunately, our past history of change is considerably slower than this. Samuel Bowser first invented the petrol pump in 1885 but it wasn't until 1988 that all new cars manufactured in the UK were required to use unleaded petrol only.

Not only do fossil fuels pose an environmental hazard but there is also a pressing need to find an alternative energy source that is renewable. Opinions as to how much oil remains vary considerably. Some say that the Earth has produced only 18 per cent of its potential yield of oil; others say supplies may run out by 2051, with gas following 10 years later. To counter this, many countries are investing heavily in alternative energy sources such as solar energy or wind power, which uses large turbines to capture the energy of the wind.

- 1 How do you write CO<sub>2</sub> in full? .....
- 2 What do we call fuels such as coal, gas and oil?  
.....
- 3 What are two names for the substance that comes out of the exhaust of a car? .....
- 4 What do we call fuels that can be produced at any time?  
.....
- 5 Name two types of alternative energy.  
.....
- 6 What is a turbine most similar to?  
A a large engine      B a windmill      C a car

**Alternative fuels****2.2** Complete the text with words from the box.

alternative    converting    eco-friendly    emit    engine    fuel    fumes    greenhouse gases    plant    solar

**Fueling our cars**

Our love of the fuel-burning car with its poisonous exhaust (1) ..... has had a devastating effect both on our environment and on oil supplies. It is unlikely we will abandon our cars in large enough numbers to resolve this problem, so there is a pressing need to find an (2) ..... fuel. Many car companies are exploring (3) ..... energy sources, which have a surprisingly long history. In 1899, electric cars were very popular in the US, and in 1901, Ferdinand Porsche designed the first hybrid car. Both are now making a comeback and are likely to become much more commonplace in the future. Hydrogen vehicles can be traced back even further, to 1807. These use (4) ..... panels to extract hydrogen from water are also likely to be readily available in the near future. As they (5) ..... only water vapour, they do not contribute to (6) ..... While countries such as Germany and Japan already have ambitious hydrogen plans, critics say that building a network of fuelling stations and (7) ..... existing petrol stations to hydrogen will prove too costly and will limit this vehicle's potential.

Others believe that biofuels are the future. These fuels are based on (8) ..... oils and so can be grown. The concept of using vegetable oil as a (9) ..... dates back to 1895 when Dr Rudolf Diesel developed the first diesel (10) ..... to run on vegetable oil. He demonstrated his engine at the World Exhibition in Paris in 1900 and described an experiment using peanut oil as fuel in his engine. In 1912, Diesel said, 'The use of vegetable oils for engine fuels may seem insignificant today. But such oils may become in the course of time as important as petroleum and the coal tar products of the present time.'

## Error warning!



Gas is the American word for *petrol*. *Smoke* is produced when something burns. *Fumes* are the gases produced by chemicals such as petrol. Older cars generate a great deal of **fumes**. NOT *a great deal of gas* / *a great deal of smoke*

## 2.3 Decide whether these sentences are true or false. Underline the parts of the text that gave you your answer.

- 1 Cars that run on electricity and petrol first appeared in 1901. True
- 2 Water is produced from the exhausts of hydrogen cars. ....
- 3 It will be relatively inexpensive to change current petrol stations for hydrogen cars. ....
- 4 Biofuels are non-renewable. ....
- 5 In 1912 vegetable oil was seen as an important fuel source. ....

## 2.4 Which is the odd one out? Try to explain why.

- 1 curb / limit / promote / restrict The other words mean 'to reduce'.
- 2 electricity / nuclear energy / solar energy / wind power .....
- 3 economical / effective / efficient / emission .....
- 4 carbon / fuel / gas / petrol .....
- 5 emit / discharge / release / retain .....
- 6 renewable / disposable / rechargeable .....
- 7 diminish / dwindle / deplete / drastic .....
- 8 consume / extend / exhaust / expend .....
- 9 conserve / preserve / reserve / save .....

## 2.5 Answer these questions using as many new words and phrases from this unit as you can. If possible, record yourself and then listen to your answers.

- 1 Do you think that you waste too much energy in the home? (Why / Why not?)
- 2 What can the government do to encourage people to save energy in the home?
- 3 Why do you think some people prefer to drive a car instead of using public transport?
- 4 Do you feel optimistic about the future in terms of energy? (Why / Why not?)
- 5 What changes to transport do you think will happen in the next 20 years?

## Test tip



In the speaking test you will be assessed on your 'lexical resource' – in other words, whether you can use a wide range of vocabulary accurately. Think about your answers to these questions. Did you have to hesitate to search for words? Which words did you manage to use? Which words do you still need to practise?

# Test practice

## Academic Reading

In 2011, the US Environmental Protection Agency honoured famous country and western singer Willie Nelson for his efforts to promote the use of biodiesel through his own 'BioWillie' brand, a vegetable oil-based fuel which was then being distributed at filling stations nationally. However, by 2014, the venture had failed. Clearly, many hurdles stand in the way of making such biofuels commercially viable with traditional sources. Indeed, it remains very difficult to forecast whether powering our vehicles with crop derivatives will ever be a truly economical proposition. Nevertheless, it is not too early to ponder what impact the widespread adoption of biofuels would have on our environment.

In 2006, Michael S. Briggs, a biodiesel advocate at the University of New Hampshire, estimated that the United States would need about 140 billion gallons of biodiesel each year to replace all the petroleum-based transportation fuels currently being used. Although one could make a similar appraisal for the amount of sugar-derived ethanol needed to meet our needs, it is unlikely that drivers would ever want to fill up their tanks entirely with ethanol, which contains only two-thirds of the energy of gasoline, whereas biodiesel is only 2 per cent less fuel-efficient than petroleum-based diesel. Hence a switch to biofuels would demand no new technology and would not significantly reduce the driving range of a car or truck.

The main source of biodiesel is plant oil derived from crops such as rapeseed. An acre of rapeseed could provide about 100 gallons of biodiesel per year. To fuel America in this way would thus require 1.4 billion acres of rapeseed fields. This number is a sizeable fraction of the total US land area (2.4 billion acres) and considerably more than the 400 million acres currently under cultivation. Consequently, the burden on freshwater supplies and the general disruption that would accompany such a switch in fuel sources would be immense.

Such calculations are sobering. They suggest that weaning ourselves off petroleum fuels and growing rapeseed instead would be an environmental catastrophe. Are more productive oil crops the answer? Oil palms currently top the list because they can provide enough oil to produce about 500 gallons of biodiesel per acre per year, which reduces the land requirement fivefold. Yet its cultivation demands a tropical climate, and its large-scale production, which currently comes from such countries as Malaysia and Indonesia, is a significant factor in the ongoing destruction of what rainforest remains there. Conservationists have been warning that palm oil production poses a dire threat to the dwindling population of orang-utans, for example, which exist only in the wild in Borneo and Sumatra. So here again, the prospect of dedicating sufficient land to growing feedstock for the world's transportation needs promises to be an environmental nightmare.

There is, however, a 'crop' that is widely recognised as having the potential to meet the demands of a biodiesel-based transportation fleet without devastating the natural landscape: algae. Algae is a single-celled plant, some varieties of which can contain 50 per cent or more oil. They also grow much more rapidly than ordinary plants and can double in quantity within several hours.

The US Department of Energy funded considerable research on biofuel production using algae after the oil problems of the 1970s, an effort known as the Aquatic Species Program. Although this programme was terminated in the 1990s, a lot of experience was gained through research and various demonstration projects. The results suggested that algae can be grown in sufficient density to produce several thousand gallons of biodiesel per acre per year – a full order of magnitude better than can be expected using palm oil and two orders of magnitude better than soybeans.



It is not surprising then that many scientists and entrepreneurs are once again looking hard at the prospects for using algae to produce transportation fuels and sizeable amounts of money are being invested in various schemes for doing so. David Bayless, a professor of mechanical engineering at Ohio University, has been working with scientists to engineer a device that can grow cyanobacteria (blue-green algae). It uses carbon dioxide from the gases emitted from power-plant chimneys and sunlight that is distributed to the growing surfaces through optical fibres. Bayless uses an enclosed bioreactor and claims to be able to produce as much as 60 grams of biomass per square metre of growing surface per day.

Another recent effort is being carried out in San Diego by KentSeaTech Corporation. This company gained experience growing algae as a part of its aquaculture operations so was quick to respond when the California state government started looking for ways to treat the huge quantities of nutrient-laden water which runs off from adjacent farm lands. 'It's no real difficult feat to turn nutrients into algae,' says director of research Jon Van Olst, 'but how do you get it out of the water?' This is what Van Olst and his co-workers have been trying to achieve.

The people working on these ventures are clearly eager to make growing algae a commercial success. Yet it is not hard to find experts who view such prospects as dim indeed. John Benemann, a private consultant in California, has decades of experience in this area. He is particularly sceptical about attempts to make algae production more economical by using enclosed bioreactors rather than open ponds. He points out that Japan spent hundreds of millions of dollars on such research, which never went anywhere. Even Van Olst has serious reservations. 'It may work,' he says, 'but it is going to take a while and a lot of research before we get anywhere.'

### Questions 1–5

Classify the following characteristics as belonging to

- A** biodiesel
- B** ethanol
- C** ordinary diesel

Write the correct answers **A–C** next to questions 1–5.

- 1 Produced by a popular American entertainer. ....
- 2 This fuel gives only slightly more power than its renewable equivalent. ....
- 3 Provides two-thirds of the power of standard petrol. ....
- 4 Your car's performance will be almost unchanged if you change to this fuel. ....
- 5 Production can have a negative impact on water resources. ....

**Questions 6–12**

Do the following statements agree with the claims of the writer in the reading passage?

Next to questions 6–12 write

<b>Yes</b>	if the statement agrees with the claims of the writer
<b>No</b>	if the statement contradicts the claims of the writer
<b>Not given</b>	if it is impossible to say what the writer thinks about this

- 6 2% of Americans already use biodiesel. ....
- 7 At present in America, 400 million acres of land are used for agriculture. ....
- 8 The use of palm oil as a fuel source will require more land than using rapeseed oil. ....
- 9 Growing biodiesel crops has had a positive effect on local wildlife in some areas. ....
- 10 One advantage of algae is the speed with which it grows. ....
- 11 David Bayless believes that algae can produce more energy than solar power. ....
- 12 It is easy to grow algae using agricultural waste water. ....

**Question 13**

Choose the correct answer, **A**, **B**, **C** or **D**.

- 13 What is the main purpose of this article?
- A** To prove that biofuels could totally replace petrol in America.
  - B** To examine the environmental impact of standard fuel sources.
  - C** To assess the advantages and disadvantages of different types of fuel.
  - D** To show that an international effort is required to solve the fuel crisis.