

A new wake-up fuel

Demand for cheaper, 'greener' and more viable fuel sources has led to large-scale research into long-term alternatives to fossil fuels. It is now possible to run a vehicle on biofuels derived from, for example, sugar cane, corn and soybeans.

The production of 'green' biodiesels is not without controversy, however. For a start, the main ingredient, or 'feedstock', (eg rapeseed, palm oil, soybean oil) is often cultivated on land that could otherwise be utilised for food crops. There can also be an issue with the production process as in the case of some biofuels, as it ironically involves the use of fossil fuels – which are far from 'green'. Another drawback is that the technology needed to manufacture some biofuels can be incredibly expensive.

Due to such controversial aspects, a number of cutting-edge alternatives are being developed. One option, involving coffee, appears to be both environmentally and economically viable and has got scientists at the University of Nevada very excited. While oil for biodiesel production has, for a number of years, been extracted from imperfect or surplus coffee beans in Brazil, the use of used or 'spent' coffee grounds as a feedstock for biofuel manufacture is, quite literally, ground-breaking.

Not only do these grounds provide a more versatile and environmentally friendly source of 'green' energy, but they are also cheap and abundantly available. The oil extracted from them, which in turn is converted to biodiesel, is of a high quality and results in a far more stable fuel than many of its competitors. Furthermore, the manufacturing costs are relatively low and leave a lower carbon footprint. Any waste solids remaining from production can be used as compost or fertiliser, or even converted to bioethanol, rather than be dumped in landfill sites.

The only real limitation to using spent coffee grounds is access to a sufficiently high quantity of low-cost but high-quality grounds. Fortunately though, the number of people consuming coffee worldwide is increasing substantially, such that it is now the most popular beverage globally. The use of coffee grounds to produce 'green' fuel, would in effect, be the perfect way to manage the waste from the 7 billion or more kilos of coffee produced each year.

While biodiesel derived from used coffee grounds will never take over as the main source of fuel, scientists are confident that it would add around 340 million gallons of fuel to the world's fuel supply either in combination with regular diesel or on its own as a stand-alone alternative for diesel engines. So, in the near future, perhaps your coffee will be fuelling more than just your body.

1 Which paragraph in the text (2–5) talks about the following?

- | | | |
|---|---|-----------------|
| 1 | The emergence of new and exciting biofuel options | paragraph _____ |
| 2 | A fresh alternative | paragraph _____ |
| 3 | Why coffee grounds may be the answer | paragraph _____ |
| 4 | Downsides of biofuel production | paragraph _____ |
| 5 | A problem and a solution | paragraph _____ |

2 Read the article and decide if the sentences are true (T) or false (F), according to the text. Circle the correct statements and correct those that are false.

- | | | |
|---|--|-------|
| 1 | Whilst biofuels are often considered as 'green', this is not always the case. | T / F |
| 2 | Fortunately, the cost of making biofuels is always very low. | T / F |
| 3 | Brazil has been using coffee grounds to produce biofuel for several years. | T / F |
| 4 | The manufacture of biodiesel from coffee grounds is environmentally friendly and only produces a small quantity of carbon. | T / F |
| 5 | Using the spent coffee grounds would not only provide 'green' fuel but also lead to there being less coffee waste to dump. | T / F |
| 6 | It is believed that biodiesel from waste will become the dominant fuel in the future. | T / F |

3 Complete the table of words from the text with the missing forms.

Verb	Noun		Verb	Noun
	combination		derive	
	option		cultivate	
	production		appear	
	limitation		consume	
	source		extract	

4 Which verbs from exercise 3 have the following meanings?

- 1 eat or drink up; use _____
- 2 make a choice; choose _____
- 3 make or manufacture something _____
- 4 seem or be perceived as through evidence _____
- 5 mix or join two substances (or more) to make one _____
- 6 obtain or acquire something from a particular place _____
- 7 come or originate from another source or substance _____
- 8 remove a substance from something which contains it _____
- 9 prepare and use land for the growing of crops and plants _____
- 10 restrict or stop an amount or number from increasing beyond a set point _____

5 Use the correct form of a verb or noun from exercise 3 to complete the sentences. More than one option may be possible.

- 1 The discovery that coffee beans were a _____ of oil was purely accidental.
- 2 Diesel engines give you the _____ to add biofuel to the tank if you choose to do so.
- 3 If food scarcity is to be _____, fertile land must not be used to grow biofuel crops.
- 4 Fuel was first _____ from peanut oil by Rudolph Diesel in the late 19th century.
- 5 If more coffee is being _____, it is logical to make the most of the waste produced.
- 6 In the future, it is likely that a _____ of energy sources will be used in our cars.
- 7 Fossil fuels are required in the _____ and processing of corn-derived biofuels.
- 8 It _____ that the cost of making biofuel from algae is far too expensive to be viable.
- 9 In India, the oil _____ from the black seeds of the jatropha plant can be used to run a generator or be converted into biodiesel.
- 10 Brazil has increased the quantity of sugar cane it _____ to meet the rising demand for bioethanol made from it.

6 Discuss these questions with your partner(s).

- What did you find interesting or surprising about the text?
- Does this text make you want to switch to a greener fuel? (Why / Why not?)
- What alternative 'green' fuel sources might be practical for your own country? (Why?)
- Which of the following do you consider is the most important and why?
 - Reducing the number of vehicles on the road.
 - Creating low-cost 'green' fuels.
 - Improving public transport systems.

Glossary

bioethanol (*noun*) - a biofuel from alcohol that can be mixed with petrol for use in vehicles

cutting-edge (*adj*) - the newest and most exciting stage in the development of something

extract (*verb*) - to remove or obtain something from a source which contains it

ground-breaking (*adj*) - a new discovery or an innovative method to do something

ironically (*adv*) - when the opposite of what you expect happens or is true

stable (*adj*) - steady and unlikely to change in structure or state

surplus (*adj*) - an amount of something that is more than what is needed or used

versatile (*adj*) - having or capable of many different uses

viable (*adj*) - something that is practical or may work successfully