Answers Underground



Burying greenhouse gases to slow global warming

A. One way to slow global warming is to take the greenhouse gases that cause it and bury them. That is the idea behind projects now under way to capture emissions from power plants and factories and force them underground or deep into the ocean. There, proponents argue, they could be trapped for thousands of years.

B. This concept, known as carbon sequestration, is already being used by oil companies to improve the efficiency of oil wells, and now engineers have begun exploring ways to capture carbon dioxide emissions from power plants to reduce their impact on the environment. At a recent conference, delegates from fourteen industrialised and developing countries agreed to engage in cooperative research into capturing and storing carbon dioxide.

C. The goal is to stabilise emissions of greenhouse gases that trap heat in the atmosphere. Over the past century, airborne carbon dioxide concentrations have risen by nearly a third,

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according to Scott Klara, sequestration manager at the US National Energy Technology Laboratory. Unless emissions are slashed by two thirds worldwide, the Intergovernmental Panel on Climate Change predicts that concentrations will rise to double the levels of the early 1700s, before the Industrial Revolution. These increased levels of carbon-based compounds in the atmosphere are believed to be the cause of rising temperatures and sea levels around the world. Ignoring the problem is therefore not an option.

D. Limiting emissions, however, is not an easy undertaking since increased energy consumption is a key to economic growth. Two thirds of the world's power-generating capacity, expected to come into use by 2030, has not been constructed yet, according to the International Energy Agency. The developing world will be particularly important. China and India alone are expected to account for two thirds of the global increase in coal usage over the next fifteen years.

E. Solutions are being sought. Work is being undertaken with alternatives to fossil fuels such as wind and solar energy, but it will be a long time before these alternative sources play a major role in fulfilling the world's energy needs. Geophysicist Klaus Lackner points out that around 85% of the world's energy is derived from fossil fuels, the cheapest and most plentiful energy source available, and the developing world in particular is unlikely to give them up. That is why many scientists support sequestration

F. However, several problems must be resolved before sequestration plays a key role in a low-carbon future. One is the cost of capturing carbon dioxide. A second is storing the gas safely once it's been captured. Today, it costs about $US50 to extract and store a tonne of carbon dioxide from a power plant, which raises the cost of producing electricity by 30-80%. Lackner argues that it is too expensive to adapt existing plants to capture carbon dioxide.

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Instead, he recommends that carbon- capturing capacity be built into future plants. Economic incentives are needed to encourage companies to identify low-cost carbon-sequestration solutions. A government-supported program in the US has enabled some factories to partially capture carbon emissions, which they then sell for various uses, including carbonating soft drinks. However, there are no power plants ready for full carbon capture.

G. Once the carbon has been captured it must be stored. Natural carbon sinks, such as forests and wetlands, can remove some carbon dioxide from the atmosphere, but not nearly enough. Carbon dioxide could be pumped to the bottom of the ocean, where the pressure would keep it pinned to the seabed in liquid form for decades, but that has serious long-term environmental risks. David Hawkins, from the Natural Resources Defense Council in Washington, warns that the carbon dioxide could radically alter the chemical balance in the ocean, with potentially harmful consequences for marine life. Others worry that the carbon dioxide could escape back into the atmosphere.

H. A few promising attempts at underground carbon sequestration are currently under way. In western Canada, an oil company is pumping liquefied carbon dioxide into oil wells to force more oil to the surface and boost recovery by 10-15%. The company gets the carbon dioxide via a pipeline from North Dakota in the US, where the gas is captured from a synthetic-fuel plant. In another instance in the North Sea, a Norwegian energy firm is injecting carbon dioxide waste from its natural-gas operations into a saline aquifer 1,000 metres beneath the ocean floor.

I. Clearly, storing large amounts of gas underground raises environmental fears. Environmentalists argue that more research is needed on potential storage

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sites, such as oil and gas reservoirs and coal seams unsuitable for mining, to ensure that they offer long-term solutions. The World Wide Fund for Nature Australia has argued that the primary risk of underground storage is that dangerously large volumes of carbon dioxide might escape and people become asphyxiated.

J. Little progress in slashing global greenhouse gases can be achieved without involving developing countries, but for now carbon sequestration is not their priority because of the increased costs this would add to energy production. Hawkins argues that, to encourage developing nations to use sequestration, developed nations will have to provide assistance. He suggests a multilateral initiative in which developed nations, perhaps by purchasing carbon credits from poorer countries, finance the difference between the cost of a regular coal-fired power plant and one that captures carbon emissions. That is, the rich - who will remain the world's biggest polluters for years to come - would buy the right to emit carbon from the poor, who would use the proceeds to build better plants.

Questions 1-6

Look at the following issues (Questions 1-6) and the list of people and organisations below.

Match each issue with the correct person or organization, ***A-F.***

Write the correct letter, **A-F,** in boxes 1-6 on your answer sheet.

NB *You may use any letter more than once.*

1 The cost implications of fitting plants with the necessary equipment.

2 The effects of sequestration could have on sea creatures.

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3 The reasons why products such as oil and gas continue to be popular energy sources.

4 The need for industrialised countries to give aid to less wealthy countries.

5 The significant increase in carbon dioxide concentrations in the air over the last 100 years.

6 The potential for sequestration to harm human life.

List of People and organisations

A Scott Klara

B Intergovernmental Panel on Climate Change

C International Energy Agency

D Klaus Lackner

E David Hawkins

F World Wide Fund for Nature Australia

Questions 7- 9

Reading Passage has ten paragraphs, A-J.

Which paragraph contains the following information?

Write the correct letter, A-J, in boxes 7-9 on your answer sheet.

7 Examples of sequestration already in use in several parts of the world

8 An example of putting carbon dioxide emissions to use in the food and beverage industry

9 Current examples of the environmental harm attributed to carbon dioxide in the air

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Questions 10-13

Do the following statements agree with the information given in Reading Passage?

In boxes 10-13 on your answer sheet, write

TRUE *if the statement agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

10 [ ] Both developing and developed nations have decided to investigate carbon dioxide sequestration.

11 [ ] A growing economy will use more power.

12 [ ] Capturing carbon dioxide has become financially attractive.

13 [ ] More forests need to be planted to improve the atmosphere.

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