

# Support material #3:

## Answers and discussion topics for the Energy quiz

### Question 1

Which of the following are sources of energy?

Answer: e (all)

#### Topics to discuss

- The sun is the major source of all energy.
- The different meanings of the word 'energy'. The *Macquarie Dictionary* defines energy as the 'capacity or habit of vigorous activity'. But to measure and therefore save on household energy use we need to understand the physicists' definition of energy, which is the 'capacity to do work'.
- Energy can occur in many forms – light, heat, sound, radio waves, X-rays, nuclear.
- Energy can be kinetic (movement) or potential (position).
- Energy can be changed from one form to another.
- Energy is not easy to measure accurately. A piece of coal has energy – to measure the energy it contains, we burn and then measure the work it does. Some useful relationships to discuss with students are

1. the unit used to measure work and hence energy is a joule (J)
2. 1 joule = 0.239 calories
3. 1 calorie is the heat energy required to raise the temperature of 1 gram of water by 1°C
4. 1 kilojoule = 1000 joules
5. power is energy used per unit of time
6. 1 watt = consumption of 1 joule of energy every second.

Further information can be obtained from any junior physics textbook or libraries, or by accessing websites (see *Support material #6: Website links*).

### Question 2

Which of these are renewable energy sources?

Answer: c (sun), d (wind)

#### Topics to discuss

- The concept of renewable energy.
- The advantages of using renewable energy.
- The impact on communities of renewable energy sources being used more widely.

For further information see *Support material #1: Information about energy*.

### Question 3

Which of these are non-renewable energy sources?

Answer: a (coal), b (natural gas), e (crude oil)

#### Topics to discuss

- The environmental effects of burning coal, oil and natural gas.

- The necessity for a change to using more renewable energy sources.
- The impact on communities, coal exports and the environment if the mining industry closes or is reduced. Ideas to assist a changeover.

Further information can be found in the library or by accessing websites (see *Support material #6: Website links*).

### Question 4

Which of these are fossil fuels?

Answer: a (coal), b (natural gas), e (crude oil)

#### Topics to discuss

- How fossil fuels are formed.

Fossil fuels are composed of the remains of plants and animals trapped in sedimentary rocks. The two most important fossil fuels, coal and oil, provide most of the energy used for domestic and commercial purposes in Australia.

Further information about the formation of fossil fuels can be found in libraries. A comprehensive text is I. F. Clark and B. J. Cook, *Geological Science Perspectives of the Earth*, published by the Australian Academy of Science.

### Question 5

Which of these are greenhouse gases?

Answer: b (carbon dioxide), d (methane)

#### Topics to discuss

- Carbon dioxide is the major greenhouse gas.
- What produces greenhouse gases?
- Why are they called greenhouse gases?
- Advantages and disadvantages of greenhouse gases.

Information about greenhouse gases is provided in *Support material #2: Sustainability starts at home*.

Further information can be found in the library or by accessing websites (see *Support material #6: Website links*).

### Question 6

What sources of energy do you use at home?

Answer: Any of the answers listed

#### Topics to discuss

- What factors influence the forms of energy used in households?

For example: whether it is a city or rural dwelling, types of appliances, renting or buying, economic factors, knowledge or lack of knowledge regarding alternative energy sources.

- Are some forms more economical than others?
- Are some forms cleaner than others?

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For example: burning coal to produce electricity pollutes the atmosphere and produces greenhouse gases, whereas using solar and wind does not. Nuclear energy produces extremely dangerous waste products, and requires fossil fuels for the mining, extraction and refining of uranium.

- Are some energy forms more suitable for certain appliances?

For example: electricity for lighting, ironing and computers, gas for some cooking appliances.

- Do Government incentives (e.g. rebates on solar systems, environmental friendly appliances) affect people's decisions? Why?

### Question 7

**What sources of energy are used in your community?**

**Answer:** Any of the answers listed

#### Topics to discuss

- What is the most common form of energy used in your community?
- Is there any evidence of a change to renewable energy forms, such as solar or wind, in your community?

You could ask your energy supplier(s) about what they are doing about solar and wind energy and find out how many of their domestic and business customers are using these energy forms.

### Question 8

**Which of the following are primary energy sources?**

**Answer:** a (natural gas), c (coal), d (sun), e (wind)

#### Topics to discuss

- What difficulties are there in accessing energy directly from primary energy sources?

Although we can burn coal for cooking and household heating we cannot convert it to electricity in the home. Generators can be used to convert coal into electricity. However, they are noisy and expensive to run. In the past, waterwheels were used to harness hydro energy and some farms still use windmills to generate their own energy, but these processes are impractical for city and suburban power supplies.

- Problems with energy sources such as coal, petroleum, uranium.
  1. Coal is non-renewable, destroys landscapes when mined, produces pollutants and greenhouse gases.
  2. Petroleum is non-renewable, has the potential to destroy ocean life during transport, produces

pollutants and greenhouse gases.

3. Uranium mining destroys landscapes, there are enormous risks during every stage of the production cycle and it is an expensive process.

For further information see *Support material #1: Information about energy*.

Additional resources can be found in the library or by accessing websites (see *Support material #6: Website links*).

### Question 9

**Which primary energy source is most used to produce electricity in Australia?**

**Answer:** d (coal)

#### Topics to discuss

- Where does most of our coal come from? (Examples include the Gippsland basin in Victoria, the Arckaringa Basin and Leigh Creek in South Australia and Sydney Basin which is close to significant coal resources in the Hunter, Central Coast and Western coalfields in New South Wales.)
- How is electricity produced from coal?

Further information about coal and electricity production can be found in the library or by accessing websites (see *Support material #6: Website links*).

Useful information is provided in I. F. Clark and B. J. Cook, *Geological Science Perspectives of the Earth*, published by the Australian Academy of Science.

### Question 10

**Conservation of energy means?**

**Answer:** c (saving it)

#### Topics to discuss

- What does energy efficiency mean?
- The growth of energy use by industrial societies and the need for conservation.

Modern industrial society depends on far more energy than human and animal labour can provide. Most of the energy provided comes directly or indirectly from the burning of fossil fuels. Fossil fuel supply is limited and burning fossil fuels produces carbon dioxide and pollutants.

- What possible steps can be taken to reduce the effect of atmospheric pollutants and the inevitable total depletion of fossil fuels, but maintain the perceived level of household and industrial energy requirements in the future?

Additional resources can be found in the library or by

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accessing websites (see *Support material #6: Website links*).

## Question 11

Increased global warming over the past fifty years has been caused by?

Answer: b (greenhouse gas emissions)

### Topics to discuss

- What is the enhanced greenhouse effect?
- What evidence is there that global warming exists?
- What are the likely effects of global warming?

Information about global warming and greenhouse gases is provided in *Support material #2: Sustainability starts at home*.

Further information can be found in libraries or by accessing websites (see *Support material #6: Website links*).

