

# Activity 1

## Energy quiz

## Calculate

### Section 1

#### Aim

- To review sources of energy and explore the different forms of energy used at home.

#### Students need

- *Information about energy*

#### For the teacher

- Make a copy of *Information about energy* (Support materials, pages 67–68) for each student and hand it out after the completion of the quiz.
- At the conclusion of the activity conduct a class discussion. Be sure to discuss the different concepts raised in the quiz questions (see pages 21–23 for discussion topics, etc.).



#### Action plan

1. Circle the correct answer(s) in questions 1–11.
2. Write your responses to question 13 on the back of this sheet.
3. Discuss your responses as a class.

#### Questions

1. Which of the following are sources of energy?
  - a. sun
  - b. surf
  - c. wind
  - d. coal
  - e. all
2. Which of these are renewable energy sources?
  - a. coal
  - b. natural gas
  - c. sun
  - d. wind
  - e. oil
3. Which of these are non-renewable energy sources?
  - a. coal
  - b. natural gas
  - c. sun
  - d. wind
  - e. oil
4. Which of these are fossil fuels?
  - a. coal
  - b. natural gas
  - c. sun
  - d. wind
  - e. oil

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5. Which of these are greenhouse gases?
- a. oxygen
  - b. carbon dioxide
  - c. ozone
  - d. methane
  - e. helium
6. What forms of energy do you use at home?
- a. natural gas
  - b. electricity
  - c. LPG
  - d. solar
  - e. solid fuel
  - f. wood
  - g. other
7. What forms of energy are used in your community?
- a. natural gas
  - b. electricity
  - c. LPG
  - d. solar
  - e. other
8. Which of the following are primary energy sources?
- a. natural gas
  - b. electricity
  - c. coal
  - d. sun
  - e. wind

9. Which primary energy source is most used to produce electricity in Australia?
- a. uranium
  - b. sun
  - c. wind
  - d. coal
  - e. hydro
  - f. gas
10. Conservation of energy means?
- a. protecting it
  - b. using it
  - c. saving it
11. Global warming is caused by?
- a. bushfires
  - b. greenhouse gas emissions
  - c. volcanoes
  - d. sun

Write your responses to the following questions in the space below or on the back of this sheet.

12. List ten ways you use energy in the home.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

13. Continue this story.  
'It was a cold, wet Monday and I had just arrived home from school, starving, when suddenly there was an earth tremor and all commercial energy sources were immediately terminated ...'

# Assignment 1

## Energy topics

## Calculate

### Section 1

#### Aims

- To find out as much as you can about energy.
- To present your findings to the class.

#### Students need

- The items used in Activity 1, *Energy quiz*

#### For the teacher

- Allocate one or more of the topics listed to each student or group of students.
- Set a class date for presentations of the findings.
- Prepare a chart on which students' findings can be summarised.
- Suggest that students may need to complete additional research to answer their presentation topic.



#### Action plan

- Investigate your allocated presentation topic and prepare a short presentation.
- As part of your presentation, be sure to discuss what can be done to achieve sustainability of energy resources.

#### Presentation topics

1. Where does energy come from? Is it essential to life?
2. Make a list of all the activities that require energy. Next to each item list the form of energy that each requires.
3. What is the enhanced greenhouse effect? What are its causes and possible impacts? What can be done to reduce individual and household greenhouse gas emissions?
4. Make a list of renewable energy sources and the ways in which they can be used, now and in the future.
5. Make a list of non-renewable energy sources and the ways in which they are being used now. List some possible future problems associated with each type of energy source.
6. What are the different ways we produce electricity? Incorporate into your answer what fossil fuels are, what they were previously and where they came from.
7. Nuclear, biomass, geothermal, hydroelectricity, solar, coal, gas and wind are all sources of energy. Make a chart listing their advantages and disadvantages.

*Space for notes*

# Answers and discussion topics for teachers to Activity 1, *Energy quiz*

## Calculate Section 1

### 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'. However, to measure and hence 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.

### 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.

For further information see *Information about energy* (Support materials, pages 67–68).

### Question 3

**Which of these are non-renewable energy sources?**

Answer: a (coal), b (natural gas), e (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.

Further information can be found in the library or by accessing websites such as [www.altenergy.org](http://www.altenergy.org), provided in the Support materials section.

### Question 4

**Which of these are fossil fuels?**

Answer: a (coal), b (natural gas), e (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 petroleum (from 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 the library. A comprehensive text is I. F. Clark and B. J. Cook, *Geological Science Perspectives of the Earth*, Australian Academy of Science.

### Question 5

**Which of these are greenhouse gases?**

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

#### Topics to discuss

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

Information about greenhouse gases is provided in *Sustainability starts at home* (Getting started, pages 4–5).

Further information can be found in the library or by accessing websites, such as [www.altenergy.org](http://www.altenergy.org), provided in the Support materials section.

# Answers and discussion topics for teachers to Activity 1, *Energy quiz*

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### Question 6

**What forms 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?

For example: energy forms such as coal, which provides electricity, pollutes the atmosphere and adds greenhouse gases, whereas solar and wind do not. Nuclear energy does not pollute; however, its waste products are extremely dangerous and last a long time.

- Are some energy forms more suitable for certain appliances?

For example: electricity for lighting, ironing, computers, etc. Gas for some cooking appliances, a gas light is very noisy, etc.

### Question 7

**What forms 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 make enquiries from your energy supplier(s) about what they are doing about solar and wind energy and find out how many homes and businesses 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 fuel to electricity; however, these are noisy and inconvenient to run. In the past waterwheels were used to harness hydro energy and farms still use windmills to generate their own energy; however, these processes are impractical for city and suburban power supplies.

- Pros and cons of various primary energy sources such as coal, petroleum, uranium, etc.
  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. High cost generally means it is not considered as an economical energy source.

For further information see *Information about energy* (Support materials, pages 67–68).

Additional resources can be found in the library or by accessing websites.

# Answers and discussion topics for teachers to Activity 1, *Energy quiz*

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### 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? (For example the Gippsland basin in Victoria and the Arckaringa Basin and Leigh Creek in South Australia.)
- How is electricity produced from coal?

Further information about coal and electricity production can be found in the library.

Useful information is provided in I. F. Clark and B. J. Cook, *Geological Science Perspectives of the Earth*, 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. The supply of fossil fuels is limited and their burning 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 accessing websites, such as [www.living-room.org/sustain/paradigm.htm](http://www.living-room.org/sustain/paradigm.htm) provided in the Support materials section.

### Question 11

**Global warming is caused by?**

Answer: b (greenhouse gas emissions)

#### Topics to discuss

- What is the enhanced greenhouse effect?
- What evidence is there for global warming?
- What are the likely effects of climate change?

Information about global warming and greenhouse gases is provided in *Sustainability starts at home* (Getting started, pages 4–5).

Further information can be found in the library or by accessing the websites provided in the Support materials section.