



# Renewable Fuels

2008  
24 minutes

*Teacher Notes:*  
**Jodie Ashby**  
*B.Sc.B.Ed.*

## **Program Synopsis**

This program begins by looking at why we cannot sustain our current use of non-renewable resources and their environmental effects. The program then introduces students to the three most commonly used forms of renewable energy: solar power, wind power and hydroelectric power. A brief look at what is currently happening around the world follows, finishing with a look into the future and the Aurora 101.

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### **Introduction**

Traditionally we have relied heavily upon non-renewable resources, however we have reached a point globally where the environment cannot sustain such impact, nor do we have the resources to continue in this way.

This program clearly shows students the environmental impacts both non-renewable and renewable energy sources have. It guides students through the three most commonly used renewable energy sources, how the energy is collected and the pros and cons of each source.

The program also explores what is happening around the globe with the introduction of wind farms, wave parks and solar farms and concludes by looking at the development of solar race cars.

### **Program Rationale**

This program will help senior students to reinforce the environmental impact non-renewable energy resources are placing on the planet. They will come away with an understanding of the three major renewable energy sources of solar power, wind power and hydroelectric power. Students will also see where the future of energy is heading in relation to power and possible transport.

### **Program Timeline**

00:00:00	Introduction
00:01:43	Chapter 1 – Non-renewable energy
00:06:25	Chapter 2 – What is renewable energy?
00:10:13	Chapter 3 – How renewable energy works
00:15:12	Chapter 4 – What's happening around the world
00:18:16	Chapter 5 – The future
00:22:07	Credits
00:23:14	End program

### **Useful Resources**

#### **Internet Resources:**

- [www.csiro.au/science](http://www.csiro.au/science)
- [www.eia.doe.gov/](http://www.eia.doe.gov/)
- [www.re-energy.ca/](http://www.re-energy.ca/)

### **Related Programs**

- Biofuels – Alternative Energy Supply
- Nuclear Energy Series

**Program Worksheet**

**Before the Program**

1. In pairs, brainstorm as many different types of energy that you can think of. Then next to each energy source label the energy as either non-renewable or renewable.
2. List five reasons why we should convert to renewable energy sources. Share these with a friend and discuss why you think we have not begun to utilise these resources more than non-renewable resources.
3. Using the internet, investigate and provide a 300-word report on the environmental impacts that either burning coal or mining for oil has. You may also wish to discuss the long term availability of the source.

During the Program

- 1. What are the three most common types of non-renewable fuels we currently use?  
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- 2. What gas is released into the atmosphere when coal is burnt? Why is this gas dangerous?  
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- 3. Natural gas produces thirty percent less carbon dioxide than petroleum and thirty-five percent less than burning coal, so why aren't we using more of it?  
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- 4. What is renewable energy?  
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- 5. What are the three main forms of renewable energy systems currently being used?  
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- 6. State at least two reasons why the use of hydroelectric power is viable.  
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- 7. Why aren't we using more hydroelectric power?  
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- 8. Wind power is clean, efficient and doesn't release any dangerous gases into the atmosphere, so why aren't we using more of it?  
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9. Solar panels are becoming increasingly more common. What are the current problems still associated with this form of energy?

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10. When the London Array farm is fully operational how many homes can expect to be powered from the energy it collects.

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11. Portugal will be home to Europe's largest wave park, what other coastal areas around the world would be suitable locations for wave parks?

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12. The Aurora 101 is a prime example of how far we can take renewable energy. What effect will the Aurora 101 have on future vehicle design?

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### After the Program

1. Investigate one form of renewable energy and provide a report discussing how the energy is harnessed and the pros and cons of it. Include appropriate chemical equations and diagrams.
2. The planet uses around 6.2 billion tons of coal annually. How is the coal used to make electricity? Provide appropriate diagrams and chemical equations.
3. *“Currently renewable energy sources are too expensive and under developed, therefore we should just continue to use non-renewable sources until they run out.”* Provide a written response to this statement. You may agree or disagree, however you must support your response with research and facts.

**Suggested Student Responses**

**During the Program**

1. What are the three most common types of non-renewable fuels we currently use?
  - **Coal, oil, natural gas**
2. What gas is released into the atmosphere when coal is burnt? Why is this gas dangerous?
  - **Carbon dioxide. Large contributor to global warming.**
3. Natural gas produces thirty percent less carbon dioxide than petroleum and thirty five percent less than burning coal, so why aren't we using more of it?
  - **Difficult to transport and store because of its low density.**
4. What is renewable energy?
  - **Renewable energy is when we take natural resources that can replenish themselves and utilise their energy.**
5. What are the three main forms of renewable energy systems currently being used?
  - **Hydroelectric power, wind power and solar power.**
6. State at least two reasons why the use of hydroelectric power is viable.
  - **No limit to its availability, its clean, no carbon dioxide emissions, no nitrogen oxide emissions.**
7. Why aren't we using more hydroelectric power?
  - **There is only a small number of viable dams, can damage marine life and ecosystems and if a dam was to fail it would cause major damage including floods.**
8. Wind power is clean, efficient and doesn't release any dangerous gases into the atmosphere, so why aren't we using more of it?
  - **Requires a lot of space to house the turbines, we don't always have wind and therefore would need to have a secondary wind source.**
9. Solar panels are becoming increasingly more common. What are the current problems still associated with this form of energy?
  - **Its expensive, takes up a lot of space for panels in comparison to energy generated, require direct sunlight to work efficiently.**
10. When the London Array farm is fully operational how many homes can expect to be powered from the energy it collects.
  - **Seven hundred and fifty thousand (1,750,000) homes, approximately a quarter of greater London.**

11. Portugal will be home to Europe's largest wave park, what other coastal areas around the world would be suitable locations for wave parks?
  - **Spain, France, Great Britain, South Africa, South America and the US**
12. The Aurora 101 is a prime example of how far we can take renewable energy. What effect will the Aurora 101 have on future vehicle design?
  - **The technology can be incorporated into the development of other vehicles such as battery operated or hybrid vehicles.**