

# EXPLORING Environmental Solutions

Science based activities to develop  
creative thinking strategies



Upper Primary

By Sandy Tasker

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# Introduction

The application of thinking skills can be used as a valuable classroom tool to enhance the learning process and enrich educational outcomes.

In 1967, Edward de Bono developed his theories of “lateral thinking” and “parallel thinking”, thrusting creativity to the forefront as a legitimate process within thought. Parallel thinking pertains to the process of several different perspectives working in cooperation. Instead of using opposing ideas to contradict each other, these ideas are laid out in parallel as alternatives in the process towards reaching a conclusion. Edward de Bono uses the “Six Thinking Hats” method (see page 4) to facilitate this thinking process. This strategy, whereby each person adopts a different “role” in the thinking, has been used successfully with groups of all ages throughout the world, from junior primary students to executives in major corporations. The universal appeal of this method is undisputed and many schools and companies all over the globe are using the “Six Thinking Hats” approach in their daily work.

This book uses an approach based on de Bono’s Six Thinking Hats model, where activities are presented in a way that students can experience each role and share the understandings of their peers in a team environment.

For more: ▶ <https://www.debono.com>

## HOW TO USE THIS BOOK

This series consists of two books that use a creative thinking process to address topics in two different learning areas. These books, aimed at upper primary levels, each contain six topics, which are explored through a range of activity cards that promote different roles in the creative thinking process:

**Book One: Science-based: “Exploring Environmental Solutions”**

**Book Two: HASS-based: “Investigating Culture in Australia”**

## BK 1 - Science: Exploring Environmental Solutions

**Strands:** *Earth and Space Sciences, Physical Sciences, Biological Sciences, Chemical Sciences*

**Aim:** Looking at local and global issues and solutions for preserving and protecting our environment.

**Topics:** The topics are presented as QUESTIONS as each team is responsible for working on a collective answer by drawing together all of their ideas.

1. How can we create an environment that is energy efficient?
2. What are the best alternatives for enviro-friendly transport?
3. How can we promote animal conservation in our local and global community?
4. What are water-wise communities?
5. What are some new ways that we can reuse, reduce and recycle?
6. What are some environmental solutions to farming for the future?

The activity cards provide tasks, which are presented at three levels, so that each card can be used in one session, or can be covered in more depth over a series of lessons. Opportunities are provided for students to work in teams or as a class to share their findings and ideas.

An overview of each theme is available to provide students with some background information. Website references are included in the overviews and some of the activity cards so that the use of information technology can be incorporated into the program. Outcome links enable the activities to be integrated into the classroom program with ease. Assessment guidelines are also included for teachers and students and these can be modified to suit classroom requirements. Students have the opportunity to investigate the topics fully by adopting each thinking role, thus developing an understanding that learning can occur by thinking in different ways.

# Teachers' Notes: Using the Books

The activity cards can be used according to classroom needs. Some suggested programs are shown below:

## I. GROUP ROTATION / "THINKING TEAM" METHOD – 6 WEEKS

- Suitable for 1 – 2 sessions per week (45 min – 1 hour).
- This method outlines a six-week program.
- Students are organised into "Thinking Teams" of six.
- Students stay in the same team for duration of program.
- Students work on their topic for six weeks, presenting their project to the class in Week 6.
- Each student in the team selects two roles that they would like to work on.
- They will work on the first role (**Think Tank** and **Research Station** tasks) for Weeks 1 – 3, and the second role (**Act Now** task) for Weeks 4 – 6.
- Students work on the activity card for their role during classroom time and then report back findings during team meetings. This way, all findings from the six roles can be shared.
- By the end of the six weeks, students would have worked in detail on two of the roles, but shared findings and organised a presentation with team mates working on the other roles.

### EXAMPLE:

- Team A is given a topic to work on for six weeks e.g. *Energy efficient environments*.
- Each team member selects TWO roles that they would like to work on, e.g. *Ideas Person* and *Psychologist*
- They change roles at the start of Week 4.
- Tasks are to be completed in 1 – 2 sessions of 45 – 60 min.



### Week 1

► Role in Team: **IDEAS PERSON**

Meet with team. Read out all tasks to generate interest and awareness. Choose and complete 1 – 2 "Think Tank" tasks.

### Week 2

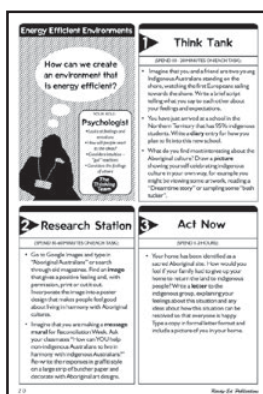
► Role in Team: **IDEAS PERSON**

Choose and complete 1 – 2 "Research Station" tasks.

### Week 3

► Role in Team: **IDEAS PERSON**

Continue with "Research Station" tasks. Meet with team and share findings.



### Week 4

► Role in Team: **PSYCHOLOGIST**

Change to new role in team (switch activity cards with team mates). Begin working on "Act Now" task.

### Week 5

► Role in Team: **PSYCHOLOGIST**

Continue working on "Act Now" task. Meet with team to plan class presentation.

### Week 6

► Role in Team: **PSYCHOLOGIST**

Present team's work to class. Facilitated by "TEAM LEADER".

Environmental damage is being inflicted on our earth every day by the enormous amount of industrial pollutants poured into the land, air and waterways. Much of this pollution comes from the excessive use of non-renewable energy. Why non-renewable? Fossil fuel sources such as oil, natural gas and coal have been created under the earth's surface over millions of years. These fossil fuels are burned to operate vehicles, provide heating and run electricity power stations, however, they cannot be easily replaced, so once they have been used, alternative energy sources need to be found.

*By-product* gases such as carbon dioxide, methane and nitrous oxide, produced by the use of non-renewable energy sources, are believed to have a negative impact on our environment. Surrounding the earth is a natural blanket of gases such as water vapour and carbon dioxide that keep it warm. This is known as the "greenhouse effect". However, this natural balance is being changed by these by-products of fossil fuels, leading to an unnatural increase of the greenhouse gases. The result of this is increased rainfall and global warming that leads to sea levels rising. Renewable energy sources, such as the ones listed below, seem to be the option for the future. These sources do not pose the same risk of "running out" and they do not produce gases that are potentially harmful to our atmosphere:

**Solar Energy:** In the 1950s, scientists developed special panels that use sunlight to create a charge in between two layers of a material called silicon. The charge moves through a wire to make an electrical current. Solar energy is great because once the equipment has been installed, it doesn't cost much, and the sun's energy is not likely to disappear. For isolated places, it replaces the need to be linked up by underground cables to distant power sources. Unfortunately, the initial equipment can be quite expensive and take up a lot of room, and during night-time or even cloudy days, it does not work, unless the power is stored in a battery for later.

**Wind Power:** Windmills are one example of how wind can be used as an energy source. As the wind turns the "sails" of the windmill, connected wheels turn machines that grind grains or pump water. The energy from turning windmills can also be used to

drive turbines that generate electricity. Wind farms are becoming more popular in Australia as wind does not "run out" and these farms do not produce harmful gases. Some disadvantages include the fact that wind can sometimes be too weak to generate enough power, the windmills can be a hazard to flying birds, and people think they are too noisy and ugly to have near to their homes.

**Hydropower:** Although the sun and the wind are great sources of renewable energy, they are not constant and cannot be stored. Water, however, can be collected in huge dams from rain or melting snow. Then, by opening and closing gates or pipes, a pressured flow of water from one area to another is created. This water pushes against a turbine (a spinning wheel with blades), forcing the blades to rotate and powering a generator which creates electricity. When hydroelectric stations are built, natural plant life and animals that live in or near the water may need to be moved to a safer area away from the station.

**Geothermal Energy:** This source uses heat from under the earth to create steam to power generators. This source of energy is more popular in New Zealand and parts of Europe.

**Biomass Energy:** The rubbish we throw away can actually be used as a source of energy. As landfill (buried rubbish) begins to decompose, it creates a gas that could potentially be harmful if it was simply released into the atmosphere. But if this gas is collected, it can be processed and burned to power an electricity plant. So using biomass is not only a good renewable source of energy, it solves the problem of excess gases from rubbish dumps.

Of course, another solution in the quest for reducing environmental damage is to simply **SAVE ENERGY!** There are numerous ways of doing this, and many Australian power corporations are encouraging people to be wise with the ways that they use electricity. Are you energy-wise? Check out these websites for the low-down on saving energy:

- ▶ [www.eia.gov/energyexplained/renewable-sources/](http://www.eia.gov/energyexplained/renewable-sources/)
- ▶ [www.energy.gov.au/household-guides/reduce-energy-bills](http://www.energy.gov.au/household-guides/reduce-energy-bills)



## Energy Efficient Environments

How can we create an environment that is energy efficient?



YOUR ROLE:

**Team Leader**

- Controls • Organises
- Manages • Summarises
- Ensures rules and guidelines are followed
- Coordinates the rest of the roles – brings it all together

**The Thinking Team**

## 1 Think Tank

(SPEND 10 - 20 MINUTES ON EACH TASK):

- Write about or **draw** the kinds of people you think would work well on an Environmental Energy Project.
- **Read** a copy of the tasks that each of your team mates have to do (*ask your teacher for this*).
- Write down any **ideas** that immediately spring to mind that might **help** your team mates carry out their tasks.

## 2 Research Station

(SPEND 30-60 MINUTES ON EACH TASK):

- Go to the library and make up a list of **books** and **Internet sites** that your team can use.
- Locate **telephone contacts** of energy sources in the White and Yellow Pages to help your team mates.

## 3 Act Now

(SPEND 1-2 HOURS):

- Spend 5 - 10 minutes **helping** each of your team mates with their “**Act Now**” tasks.
- Organise and chair the **meetings** that your team has. Make sure each speaker has a chance to explain what they are doing and take “**minutes**”. Draw up a plan for how your team will present the final plan. It may be as a speech, a video, a poster or a demonstration using models and charts. You will work together as a team to create this presentation, however, it is your job to ensure that this process works smoothly, and, most importantly, that everyone contributes equally to the final outcome.

## Energy Efficient Environments

How can we create an environment that is energy efficient?



YOUR ROLE:

### Researcher

- Looks at the facts – based on knowledge
- What is known / what needs to be found out?
- Who, what, where, when, why approach

The Thinking Team

1

## Think Tank

(SPEND 10 - 20 MINUTES ON EACH TASK):

- Write down the **meaning** of these terms in your own words:

*Energy, renewable, non-renewable, fossil fuels, wind farm, hydroelectricity, solar power, power plant.*

- Write down **information** under two columns based on what you know:

*Non-renewable energy sources  
Renewable energy sources*

Based on what you KNOW, why are there concerns about the ongoing use of non-renewable energy?

- Look around the room that you are in at the moment. **List** all of the ways that energy / electricity is being used.

2

## Research Station

(SPEND 30-60 MINUTES ON EACH TASK):

- Read some books or access Internet sites such as:
  - ▶ [www.eia.gov/energyexplained/renewable-sources/](http://www.eia.gov/energyexplained/renewable-sources/)

Add to or change the notes from each of the tasks above. **Reference** your information sources by writing the name of the book / author or website address next to each new fact.

- Find out what kinds of renewable energy sources are best suited to your **local area**. You may already have one in use – otherwise think about the availability of resources such as sun, water or wind. Draw a renewable energy plant near your city or town.

3

## Act Now

(SPEND 1-2 HOURS):

- Plan and carry out a study that measures how much power your classroom uses in one week (*e.g. allocate points for each appliance in the room and multiply by the number of hours they stay on*).

Visit:

▶ [www.westernpower.com.au/](http://www.westernpower.com.au/)

(*Search: Consumption*)

You should be able to find some guidelines to check out appliance power consumption.

Present your results in a report with graphs.

## Energy Efficient Environments

How can we create an environment that is energy efficient?

YOUR ROLE:

### Ideas Person

- *Uses creativity to find solutions*
- *Looks at growth of ideas*
- *Considers many alternatives*
- *Focuses on movement and options*

The Thinking Team

Ideas Person

1

## Think Tank

(SPEND 10 - 20 MINUTES ON EACH TASK):

- Draw a **picture** or a **map** of your house or classroom. Include as many “energy saving” alternatives as you can on the picture / map, e.g. a dimmer on the light switch, a skylight to save on lighting power, an “energy saver” switch on an appliance not in use.
- Think of one thing that you do in your daily life, such as reading a book, relaxing after school, helping to cook a meal. On one side of a page, write **ideas** on how you can **WASTE** as much energy as possible. On the other side, write how you can do this activity by **SAVING** as much energy as possible.
- Imagine your body is a power plant. **Draw** yourself and label how each body part helps the power plant to work, e.g. *brain = main office, stomach = fuel processor*.

**Hint:** use the digestive system as a model.

2

## Research Station

(SPEND 30-60 MINUTES ON EACH TASK):

- Make up an imaginary **diary** for a week, including as many creative energy-saving activities as you possibly can, e.g. “Today I dressed in the dark, sun-dried my bread into toast and sang tunes to my mum instead of listening to the radio”.
- Hunt around and see if you can find out the most unusual ways to save energy. Use your imagination and write a brief **paragraph** about how you can adapt these ideas to **YOUR** life.

3

## Act Now

(SPEND 1-2 HOURS):

- Draw and label a **design** for a completely new and innovative tool or implement that uses **YOUR** energy instead of wasting electricity. Perhaps it is a hand-pumped hairdryer or maybe an “electric” toothbrush powered by the movement of an exercise bike.

If possible, make a model of your idea using recycled materials.