6. Waste Minimisation

Background Information

Avoid, Reduce, Reuse and Recycle (ARRR) is often referred to as the waste management hierarchy. It says that the best way to manage your waste is to avoid it, reduce it, reuse it and then recycle it. By following this process the Coal Loader has dramatically reduced the amount of waste it sends to landfill.

The Waste Management Hierarchy is a nationally and internationally accepted guide for prioritising waste management practices. It sets out the preferred order of waste management practices, from most to least preferred. The further the activity moves up the waste management hierarchy, the more greenhouse gases are avoided and the less water and energy consumed.

The Coal Loader runs numerous workshops that assist the local community and the general public in how to avoid waste and how to better reuse and recycle resources. It also demonstrates a number of examples of ARRR on-site, including:

AVOID – the least energy intensive strategy:

- sustainably retrofitting existing buildings – for example, the original caretakers cottage is now an office and meeting space, the former mechanics workshop is now a cafe
- growing our own herbs instead of purchasing from shops
- making a conscious decision not to buy things we dont really need such as colour photocopiers
- purchasing recycled construction materials such as wood used for decking
- using reusable glasses, crockery and cutlery for all our meetings and events rather than using disposable items
- making our office a paper-free office – ie. no printing unless it is absolutely necessary
- using home-made green cleaning products instead of buying commercial, packaged products
- using a bicycle instead of a car whenever possible
- collecting seeds in the community garden to grow new plants, rather than buying new plants or seeds

REDUCE – requiring less energy than reusing or recycling:

- Diverting organic material from landfill and reducing greenhouse gases through composting, worm farming or feeding the chooks our food scraps
- A kitchen bench composting bin to recycle food waste. This reduces the amount of waste put out for garbage collection.
- Buying goods in bulk
- Using a calico bag rather than a plastic bag
- Producing our own eggs with our chooks, instead of buying eggs

REUSE – requiring more energy than reducing, however less energy than recycling.

- Resue of old street signs which have been made into a coffee table
- Reuse of old guttering as flower beds in the vertical garden
- Purchasing second hand items whenever possible such as computers, office chairs and photocopiers
- Reconditioning and repair of furniture and appliances
- Scrap paper for notes/phone messages
- Bricks from original building used to build pathways
- Turning food scraps into fertiliser for the garden by using compost bins and worm farms

RECYCLE – when materials from waste streams are broken down into raw materials and reprocessed either into the same product (closed loop) or a new product (open loop).

- Recycling all paper waste
- Collecting plastic bottles and containers for reprocessing into outdoor furniture

The Coal Loader also provides residents with a recycling station that has bins for recycling ink cartridges, mobile phones, batteries and compact fluorescent lamps.

Curriculum links:

- ✓ Stage 3 English and Science
- ✓ Stage 4 English, Mathematics and Science
- ✓ Stage 5 English, Science and History

See the Curriculum Matrix (Appendix 1) for more detail.

Further Information

Watch the Coal Loader Waste Minimisation three minute video which will give your class an overview of what you will find at the Coal Loader.

North Sydney Council *www.northsydney.nsw.gov.au*

NSW Government *www.environment.nsw.gov.au/households/recwaste*

Sustainable Schools NSW *www.sustainableschools.nsw.edu.au*

Planet Ark *www.planetark.org*

Activity 1 – An Investigation of Waste Minimisation Techniques

Activity Summary:

In this activity students will identify the different ways the Coal Loader Centre for Sustainability is avoiding, reducing, reusing and recycling waste.

Aim:

To be able use the waste hierarchy to categorise the various waste management strategies implemented at the Coal Loader.

Outcomes:

- An understanding of the waste management hierarchy
- Be able to identify different strategies to avoid, reduce, reuse, and recycle waste

Materials

Students will need to each bring a notebook and writing equipment.

Preparation:

Before visiting the Coal Loader teachers should lead a class discussion on the waste management hierarchy.

Student Worksheet – An Investigation of Waste Minimisation Techniques

Activity:

1. For each of the strategies listed in the table, decide if you would consider it to be avoiding, reducing, reusing or recycling waste. Discuss your answers as a group.

Item or process	Waste hierarchy – avoid, reduce, reuse or recycle?
Composting and worm farming	
Book swap	
Second hand computer	
Office waste paper bins	
Scrap paper as notepad	
Buying sugar in bulk rather than individual packets	
Polishing old floorboards rather purchasing new	
Not buying commercial cleaners	
Vertical garden made from old guttering	
Bricks from original building used to build pathways	
No purchases of disposal items eg plastic cups, cutlery	
Horse hair plaster ceilings retained	
Structural steel can be disassembled and used elsewhere	
Bottles and cans collected and sent for recycling	
Chickens eat food scraps and produce fresh eggs	
What else can you think of?	

Extension Activities

2. Can you identify any other strategies that the Coal Loader could use to avoid, reduce, reuse or recycle its waste? What strategies could you use at home or school?

3. An additional step in the waste hierarchy is recovery. Can you think of ways the Coal Loader could recover waste and turn into energy?

Activity 2 – Product Life Cycle Analysis

Activity summary:

This activity will demonstrate that all products have life cycles that can be studied to estimate the ecological impact of the product. Students are challenged to research and analyse the life cycle of one product, the orange juice popper, compared to another that could meet the same need with a lower ecological impact, the orange.

Aim:

To conduct a life cycle analysis on two items that both produce the same product, but which have different life cycles. Students will compare the life cycle of an orange juice popper and an orange, and examine the ecological impact of each.

Outcomes:

- Be able to research and assess the life cycle of a product
- Compare and contrast the ecological impact of different products

Materials Needed:

- Orange juice popper
- Orange

Preparation:

The teacher may choose to provide students with a copy of the Background Information for this Activity, or may choose to use it to engage the class in a discussion.

Activity 2 – Product Life Cycle Analysis

Background Information:

What is a product life cycle?

Just as living things are born, get older, and die, products also complete a life cycle. Each stage of a product's life cycle can affect the environment in different ways.

Some products, such as an orange juice popper, have many different components for example the tetra box carton, the straw, the plastic wrap to encase the straw, the ink on the label, the lining, as well as the juice itself, each of which has its own life cycle. The stages of a product's life cycle usually include:

- **Design** – A product's design can influence each stage of its life cycle and in turn the environment. Design affects which materials will be used to manufacture a product. For example, cheaper materials are often less durable, which means the product will have a short useful life. Product design can also prevent waste in many ways. Products can be designed with modular components that can be easily replaced so that the entire product does not have to be thrown away if only one piece breaks.
- **Materials Extraction** – All products are made from materials found in or on the earth. "Virgin" or "raw" materials, such as trees or ore, are directly mined or harvested from the earth, a process that can create pollution, use large amounts of energy, and deplete limited natural resources. Making new products from materials that have already been used (recycled materials) can reduce the amount of raw materials we need to take from the earth.
- **Materials Processing** – Once materials are extracted, they must be converted into a form that can be used to make products. For example, paper is made from trees, but the wood has to undergo several different processes before we can use it.
- **Manufacturing** – Products that are made in factories require a great deal of energy and water to create. The manufacturing process can also produce pollution. Many products require the use of packaging as well, to prevent spoilage, damage, contamination, and tampering.
- **Packaging & Transportation** – The use of packaging can protect products from damage and provide product information. However, packaging consumes valuable natural resources and when used excessively can be wasteful. Some packaging can be made from recycled materials. Finished products are transported in trucks, ships, planes, and trains to different locations where they are sold. All of these forms of transportation burn fossil fuels, which can contribute to global climate change.
- **Use** – The way products are used can impact the environment. For example, products that are only used once create more waste than products that are used again.
- **Reuse/Recycling/Disposal** – Using a product over and over again prevents the need to create the product from scratch, which saves resources and energy while also preventing pollution. Recycling or re-manufacturing products also reduces the amount of new materials that have to be extracted from the earth. Throwing a product away means that it will end up in a land-fill and will not be useful again.

Renewable versus non-renewable resources

A renewable resource is one that can be replaced by nature eg sun, wind, water (and oranges!)

Non renewable resources cannot be replaced by nature once they have been used. eg: oil, coal, petroleum

Student Worksheet – Product Life Cycle Analysis

In this activity you will be asked to consider the life cycle of two different products, an orange juice popper and an orange.

Complete the table below, which looks at the life cycle of the popper and the orange.

	Orange juice popper	**Orange**
		
What is this product made from?		
What materials are used to make it?		
Are they renewable or non renewable resources?		
Where did the components come from?		
Who made them?		
Where was it made?		
How is it packaged?		
How is it transported to market?		
What are the inputs and outputs of each? eg soil, air, water, fertilisers		
What will happen to the item at the end of its life?		

Class Discussion:

1. Which product do you think has the lower environmental impact? Discuss your reasons why.
2. Could you answer all the questions about each product? What information is missing and where could we go to find this out?

Using all the information you have gathered as a class help piece together a product life cycle for both the popper and the orange. You could either draw pictures to represent the different stages in the products life or you might like to use the following headings.

1. Raw materials
2. Transport
3. Manufacturing and packaging
4. Distribution
5. Use by consumer
6. Disposal or recycling

At every stage be sure you consider both the inputs eg soil, air, water, fertilisers etc, and the outputs eg waste, emissions to air and water etc

Discuss the differences between the two product life cycles. Which would you choose to buy? What could be done to reduce the environmental impact of the orange juice popper?

Extension

The Coal Loader Cafe is trying to decide how to best provide orange juice to its customers. The Cafe owners have narrowed the decision down to the following two products. They would like to order orange juice that the customers will love and that will have the lowest impact on the environment.

Organic Valley Juice	**Colo River Oranges**
• Organically grown oranges	• Farm grown oranges
• Packaged in 500ml bottles for convenience	• No packaging must squeeze own juice
• Grown in Valencia, Italy renowned for best oranges	• Grown on the Colo River (1hr from Sydney)
• Placed into cold storage to keep fresh	• No storage. Stays on tree until order taken
• Plastic bottles can be recycled	• Orange skins can be composted onsite
• Transported via air for speedy delivery	• Driven to Coal Loader Cafe (1hr drive)
• Company employs over 1200 people internationally	• Employs 12 people from the Colo River area

Which product would you choose to use in the Coal Loader cafe? Explain the factors behind your decision.

Activity 3 – Low Waste Lunch Campaign

Take away activity – for home or back at school

Activity Summary:

This activity will challenge students to design a campaign that will engage the whole of the school community to reduce waste by packing a low waste lunch. The ultimate goal is that everyone including the school canteen would participate and over time permanent changes can be made. Essential to the campaign is monitoring participation and measuring the amount of waste avoided from landfill. A waste audit is conducted both prior and post campaign to measure results.

Aim:

To reduce the amount of school waste going to landfill in the form of packaging and uneaten food.

Outcomes:

- Learn how to avoid food and packaging waste from school lunches
- Explore why food waste and packaging has an adverse impact on the environment
- Design a campaign that will inspire parents/students/teachers to take action to avoid waste from uneaten food and excess packaging
- Learn how to monitor and evaluate the success of an education campaign

Preparation:

Before undertaking a low waste lunch campaign, a waste audit should be undertaken without the knowledge of the whole school. A select group of students (eg environment group) could participate in the audit. The audit methodology has been provided.

Materials required for your audit:

- Gloves for all students participating
- Large plastic sheets, or tarp for bin contents
- Tongs
- 3 buckets or large containers
- Scales
- Waste Audit Sheet (A template can be dowloaded at *www.northeastwasteforum.org.au/NEWF/CMS/index.php?page=School_Resources*, courtesy of the North East Waste Forum)
- Camera

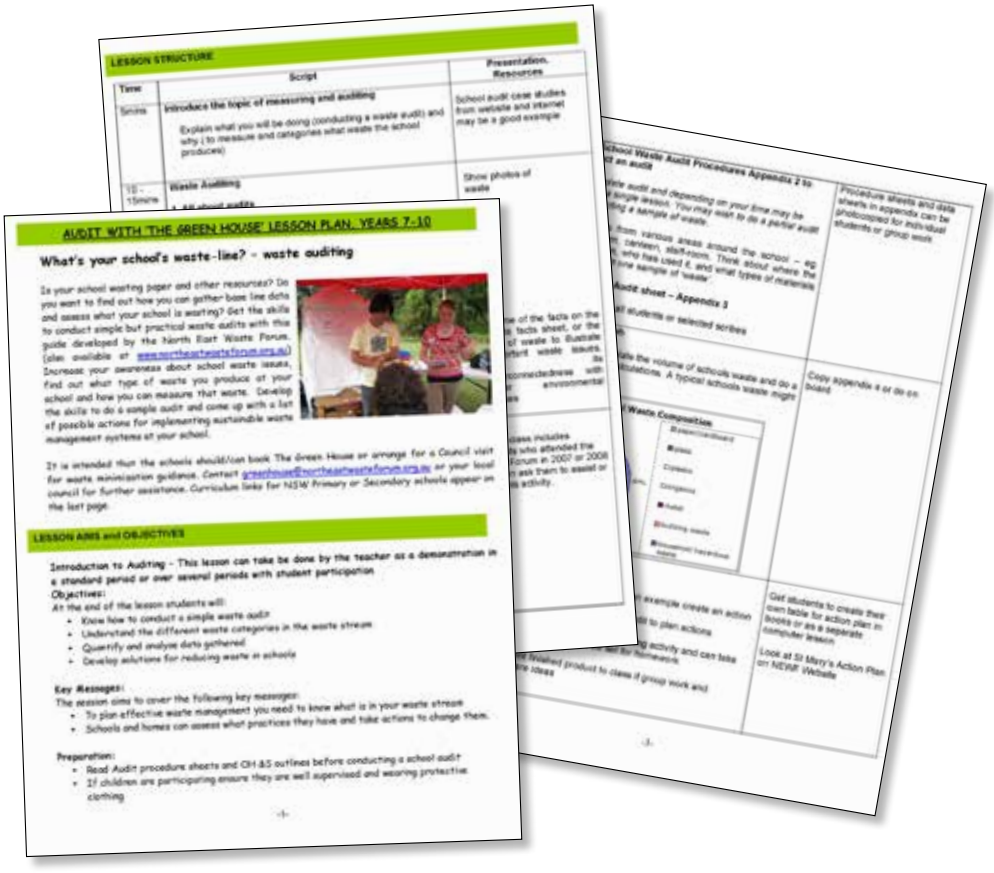
Activity 3 – Low Waste Lunch Campaign

Conducting the audit:

After lunch, on the day you have chosen, students empty all the school playground rubbish bins (not including recycling or compost bins) onto large plastic sheets or tarps.

1. Weigh your empty buckets
2. Label buckets: recyclables, compostable material, and garbage
3. The students use gloves and tongs to sort the materials into the labelled buckets
4. Weigh each bucket once it is full
5. Subtract the weight of the empty bucket to give the true weight of the waste
6. Record your results on the waste audit recording sheet.

The audit process should be repeated immediately after a low waste lunch campaign.



Further information:

North East Waste Forum *www.northeastwasteforum.org.au*

Sustainable Schools NSW *www.sustainableschools.nsw.edu.au* look under "resource centre" then "resource management" then "waste".

Student Worksheet – Low Waste Lunch Campaign

Introduction:

Low Waste Lunches are a great way to get us all to think about the *rubbish* or *waste* that we are throwing in the bin. Many of us throw things out every day without considering the environmental impact of what we are doing.

This activity will challenge you to design a campaign that will engage the whole of the school community to reduce waste by packing a low waste lunch. Before running your Low Waste Lunch campaign you will need to conduct a pre campaign waste audit. This audit needs to have your teacher's permission but must not be revealed to the whole of school community until after the audit has taken place. This is essential to be able measure the impact of your campaign on the amount of waste going to landfill.

Packing a low waste lunch is easier than you think, and they are often much healthier as they encourage us to eat more fresh food!

Low Waste Lunches:

AVOID:

- × Plastic wrap and foil
- × Disposable items like plates knives and forks
- × Paper lunch wrap
- × 'Gimmicky' packaged items e.g. chips, biscuits, small yoghurts, individually wrapped serves of food

ALWAYS:

- ✓ Use re-useable containers and drink bottles that can be washed out
- ✓ Choose items with reusable, recyclable or compostable packaging
- ✓ Pack cheese & biscuits or yoghurt from larger containers into a reuseable smaller container

Activity: The Low Waste Lunch Campaign

How you design your campaign is totally up to you however we have provided some key questions to get you thinking.

1. Who will you involve in the campaign? Think about allocating key roles and responsibilities.

2. What will be your key messages and focus?

3. What sort of educational materials or marketing strategies will you use?

4. Will your low waste lunch challenge take place on just one day or more frequently eg every week?

5. Why will people want to participate?

6. Will you offer incentives for student participation?

7. How will you communicate the results from the pre and post campaign waste audit?

8. How will you ensure that the waste reduction results will continue beyond the life of the campaign?

Extension

- Present your pre and post campaign audit results to your school Principal and request that the school designates one day each week as a Low-Waste Food Day (or Nude Food Day)
- Is your school canteen on board? Are some of the wasteful items being sold really necessary? Can they be avoided or replaced with less wasteful alternatives? Work with the canteen and the P & C to begin to address these issues.

Past school waste audits have found that the amount of uneaten food in the bins is enormous. In fact it is a problem not just faced at school, NSW households throw away more than $2.5 billion worth of edible food per year!

Your future campaigns could encourage students to come up with ideas for creating low waste lunches from last night leftovers. Log on to *www.lovefoodhatewaste.nsw.gov.au* for more information.