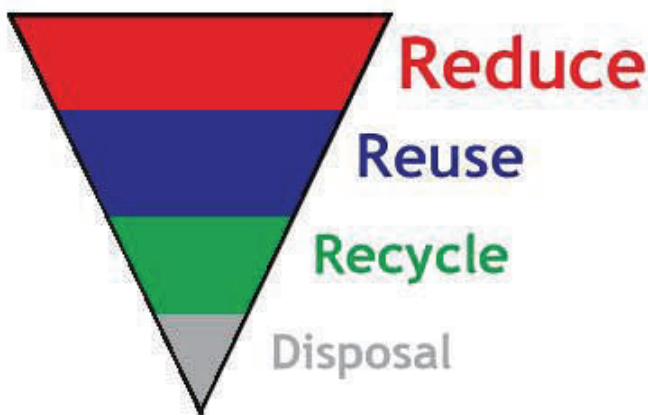


# Part 2: The Waste Hierarchy

## **Reduce** **Reuse** **Recycle** Lughdaich Ath-chleachd Ath-chuartaich

When people set about doing something to tackle the problem of waste, recycling is usually the first thing that is thought about. Recycling, while important, is not the only way to minimise the amount of waste that we produce. A concept that is used to describe the ideal means of dealing with waste is the waste hierarchy – also called ‘The Three Rs,’ that is Reduce, Reuse, Recycle. At the top of the waste hierarchy is reduce, then reuse, and then in third place, recycle, with disposal as the least desirable option. This hierarchy reflects the amount of resources that are used in terms of materials, energy and water. Therefore at the top (Reduce) there is greatest conservation of resources.

### Waste hierarchy ‘The 3 Rs’



This system can be compared to getting a grade in a test. Recycling is great – it gets a ‘C’ grade, which is a pass, but ideally we should be aiming to get a higher mark – to reduce (‘A’) or reuse (‘B’). Just like the rest of the UK the amount of rubbish we produce in Highland is growing. There are a number of reasons for this. For instance there are a lot more houses now, each producing more waste. We’ve all got a wee bit more money to spend and there are lots of pressures coming from advertisers encouraging us to spend that money on the latest gizmo, whether we need it or not. However one of the biggest culprits is over-packaged goods.

### FACT BITE

If Scotland’s lifestyle habits (energy & water use, food and waste) were repeated throughout the world, two planets would be needed to cope with the demand. Source: Scotland’s Footprint - Analysing the ecological impact of Scottish living habits in 2001

Targets are in place for increasing the proportion of our waste that is recycled and to reduce the amount of biodegradable waste that is sent to landfill. The recycling rate target for the Highlands is 50% by 2013.

The Scottish Government’s Zero Waste Plan states that by 2025 recycling needs to be increased to 70% and that waste going to landfill must be reduced to 5%. In March 2009 The Highland Council produced a joint Waste Strategy with Moray Council to identify how these targets are to be met. The Highland Council is considering treatment options to deal with organic waste – such as kitchen waste. Some residual waste may also need to be treated through an energy from waste plant to deal with the 25% of residual waste that cannot be recycled or composted.

These challenging targets for addressing the problem of our waste will mean that major changes in behaviour are needed.

### FACT BITE

Arresting global warming and environmental degradation will require a 50% reduction in world-wide material consumption. This means that industrial countries need to aim for a 90% reduction in their throughput of materials. Source: Wuppertal Institute for Climate, Environment and Energy

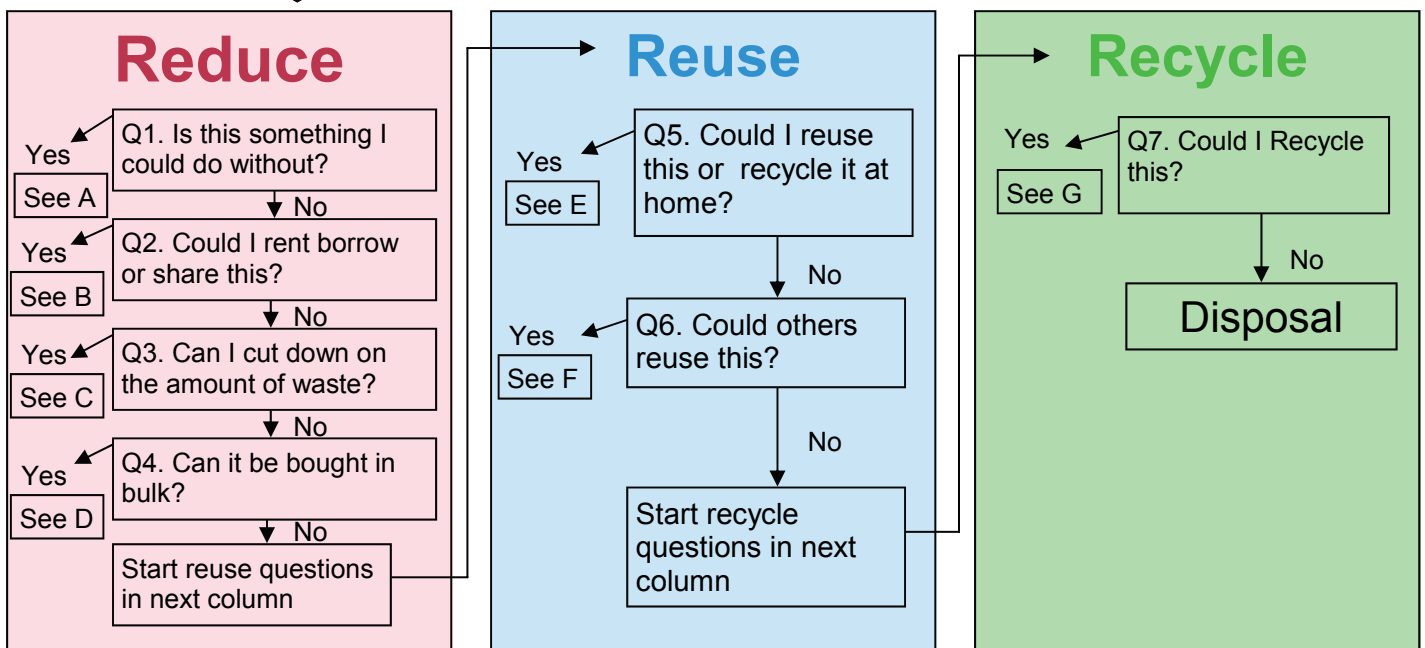
# Use the waste hierarchy to make less waste

If you would like to make a difference to your own waste, you can use the waste hierarchy to help you make decisions about what changes to make. You may find that there are simple habits you can change that don't always involve recycling or composting! The chart below had been designed to help see how you can Reduce, Reuse and Recycle your waste. There are some worked examples on the following page.

## The Waste Hierarchy Chart

## How do I make less waste?

**START HERE**



A) Some aspects of our lives that generate waste (e.g. fizzy drinks, or keeping pets or even using bubble bath!) are not always crucial, but may provide enjoyment or improve our quality of life in some way. The decision about whether to give something up can be very personal, so it is therefore up to you to weigh up the options.

B) By renting, borrowing or sharing a range of items, you reduce the goods that you consume and therefore prevent waste in the future. There are a range of things that can be rented or borrowed – ranging from books and DVDs from a library or rental club, glassware, cleaning equipment and DIY machines & tools (e.g. carpet cleaners and cement mixers). To formal wear or fancy dress clothing, and sporting equipment such as bikes or skis. You may also be able to share a range of items with family or friends, such as games and toys, sports equipment.

C) Lower waste alternatives can involve a range of options, for example buying the same goods packaged differently (switching from tinned fruit and vegetables to fresh produce), avoiding or reducing the quantities of materials that are currently not possible to recycle in the Highlands, making things for yourself (e.g. cooking from scratch with fresh ingredients) or perhaps even purchasing from a different place such as a wholesale retail outlet, a greengrocers, a butchers, a bakers or a farm shop. It is also worth considering the durability of items purchased – the longer the life-span, the less waste in the long run. A further consideration is the relative toxicity of the materials. Try to avoid items that need batteries and choose rechargeable batteries if necessary.

- D) Bulk buying can significantly reduce the packaging to product ratio and may be cheaper.
- E) Reusing items or recycling at home (e.g. papermaking or rag rugs) to extend their life is great, because it keeps our waste to landfill down and in many cases it can save you having to buy another product too, effectively reducing waste at the same time!
- F) It could well be that reuseable items you regard as waste, could be another person's resource (e.g. shredded paper as animal bedding)
- G) If an item is recyclable, then we should make the most of the facilities available!

## Using the Waste Hierarchy Chart - Worked Examples



### Newspaper:

- Q1 - Yes – you could learn about the news by watching TV, listening to the radio, or on the internet.
- Q2 - Yes – you could visit a café or library with newspapers available or could share with friends.
- Q3 - Yes – could cut down and only get a paper when there is time to read it, or just get weekend newspapers.
- Q4 - No – newspapers are not suitable to buy in bulk.
- Q5 - Yes – you could make paper logs, paper seedling pots, make papier-mâché crafts etc.
- Q6 - Yes - someone may be interested in using this for animal bedding.
- Q7 - Yes – you can recycle newspapers at Recycling Points, Centres and through the kerbside collections in your area.

### Plastic milk bottle:

- Q1 - Yes – it is possible to live on a milk-free or vegan diet, however this may not suit everyone.
- Q2 - No - it is not suitable to share this to help reduce waste.
- Q3 - Yes – you can buy milk in different types of packaging, such as in re-useable glass bottles, a cardboard carton or a box of powdered milk.
- Q4 - No – milk is not suitable to buy in bulk.

- Q5 - Yes – you could use plastic milk bottles to make garden cloches, plant guards, or in other craft activities, however, you may produce more milk bottles than you would want to reuse or recycle in this way.
- Q6 - No – while other people could reuse or recycle these, it is less likely that others will want your bottles, because people tend to use lots of milk and will have more bottles than are needed for reuse or home recycling projects.
- Q7 - Yes - you can recycle plastic milk bottles and other plastic bottles using the kerbside recycling service if you have a blue wheelie bin. You can also take plastic bottles to Recycling Centres. The bottles should be rinsed, squashed down and the caps removed.

### Football:

- Q1 - No – the keen football player will not give this up easily!
- Q2 - Yes – you could share this with your friends or brothers or sisters.
- Q3 - Yes – when choosing a new football, look for a durable one that will last longer and also look for one with less or no packaging.
- Q4 - No – it is probably not suitable to buy this in bulk.
- Q5 - No – unless you can come up with an original creative project!
- Q6 - No – see above
- Q7 - No – footballs are made up of different materials, which cannot easily be recycled.

### Cereal box:

- Q1 - Yes – you could have something different for breakfast, but not everyone will be willing to stop eating their favourite cereal!
- Q2 - No – it is not suitable to rent, borrow or share this!
- Q3 - Yes – It may be possible to buy cereal in just the plastic bags, rather than a bag in a box (e.g. at a wholesalers).
- Q4 - Yes – The larger the box, the lower the ratio of packaging to product. Try to avoid the individual helping sized boxes, as these create the most waste.
- Q5 - Yes – you can use the cardboard for craft projects, or add this to your home composter.
- Q6 - Yes – it is possible that these could be used at school or at a nursery.
- Q7 - Yes – the cardboard cereal box can be recycled using the kerbside



# Reduce

## Decreasing the amount of waste produced.

Reducing the amount of waste that is produced in the first place is the most important thing that we can do with regards to improving our waste management practices. It can also be the hardest, because it means changing habits not just in what we do with things when we're finished with them, but changing our consumption habits to choose less waste. Some simple tips are suggested below for use at school and at home.

### FACT BITE

Scottish households throw away 566,000 tonnes of food waste every year. Over two thirds of this could have been avoided if it had been more effectively planned, stored and managed. Avoidable food waste costs Scotland nearly £1 billion a year, that's the equivalent of £430 per household!  
[www.zerowastescotland.org.uk/lovefoodhatewaste](http://www.zerowastescotland.org.uk/lovefoodhatewaste)

## Top REDUCE tips for School:

- Ensure that everyone knows to photocopy on both sides.
- Set printers up to print double sided as a default setting.
- Print two pages to a sheet as another paper-saving measure.
- Have a box of one-sided scrap paper available by printers and photocopiers.
- Encourage everyone to print e-mails only when absolutely necessary. Consider adding reminders to e-mail signatures to encourage others not to print messages unnecessarily. If you do print out e-mails be careful to avoid printing out duplicate copies of the original messages.
- Only use one paper towel at a time.
- Avoid disposable, single use products, such as cleaning wipes.

## Top REDUCE tips for Home:

- Choose less packaged goods, for example buy fruit and vegetables loose.
- Buy concentrated products that use less packaging, such as cleaning products, concentrated fruit juice and squash.
- By choosing items such as wind-up torches, radios, watches and toys together with solar powered items such as garden lights you can help to reduce the amount of batteries that you need to dispose of.
- By repairing your household items you can extend their life and reduce the amount of waste you have to throw away.
- Look after stuff so that it lasts longer. For example, don't leave your bicycle out in the rain to rust and remember to oil the chain, bearings and cable regularly and keep the tyres pumped properly so they don't crack.
- You can reduce your waste by using multiple use shopping bags made from cotton or jute. Sturdy plastic 'bag for life' shopping bags are also useful.
- If you hire rather than buy you may save money and cut down on items that you may only need for a limited time. There are a range of items that can be hired readily from glassware to costumes, video & DVDs and bicycles.
- Registering with the Mailing Preference Service can stop unwanted mail that is delivered to a named addressee at your address. Call 0845 7034599 or visit [www.mpsonline.org.uk](http://www.mpsonline.org.uk)
- Another service to reduce unwanted mail is the Royal Mail Door to Door service. This can stop mail that is delivered to you without an address such as leaflets, fliers etc. To find out more: visit [www.royalmail.com](http://www.royalmail.com), email [optout@royalmail.com](mailto:optout@royalmail.com) or call 08457 950 950.



# Reduce - Activities

## Posters

To encourage the whole school to remember to cut down on waste, design posters about all the things that can be done to reduce your waste.

## Waste-free lunches

Making changes in behaviour is great – and even better if you can measure it to keep an eye on how well you are doing. But when you start to do more things to reduce your waste, it is harder to measure, because after having carefully avoided lots of waste, you have nothing to put on the scales! One way that you can monitor your success is to start a project where regular measurements are taken – and remember to start measuring before you make the changes. This activity involves examining the types of packaging that can be found in a lunchbox. We need to package our food to keep it fresh and to keep it intact. However there are several types of packaging that go straight into the bin that could be avoided.

### Typical Lunch Packaging

- Food held in a plastic carrier bag
- Food wrapped in clingfilm or aluminium foil
- Individual juice carton, pouch or Fruit Shoot bottle
- Individual crisp bags or biscuit mini-packs
- Bought sandwiches in plastic packets
- Plastic disposable cutlery, paper

### Low Waste Packaging

- Reusable sealed boxes
- Refillable water bottle – fill it with your favourite squash
- Put small quantities of crisps and biscuits from bigger packets into little containers
- Fruit – compost the apple cores, orange peels and banana skins
- Make your own biscuits and cakes. Keep them fresh in a sealed box

Before lunch, mention that at the end of lunch you will be looking at the lunch boxes, so ask the class not to put litter in the bins, but to keep it in their boxes or bags.

At the end of lunch time, collect the rubbish separating out the compostable waste such as fruit and vegetable left-overs. Make sure that there is nothing left in the lunch boxes, except for reusable boxes and bottles. Look at the compostable waste first – you may wish to collect this in a box (or compost caddy if you have one) either for composting (if your school does composting) or to examine how much of the waste could be composted. Put the waste that cannot be recycled or composted and has to go in the bin into a bag and weigh it. This can be used to examine the normal amount of waste that the class produces. Repeat the activity at regular intervals, however, be sure to send home information to parents about the Waste-Free Lunches, so that they know about what sorts of foods to include and what to avoid. Plot the progress on a chart. This links in nicely with Health Promoting Schools, because it is a way of encouraging pupils to eat more fruit and less processed snacks, which come with lots of packaging. A workshop on Waste-Free Lunches is available from the Council's Waste Management Unit.

Web links:

Visit [www.wastefreelunches.org](http://www.wastefreelunches.org) - an American site dedicated to waste free lunches or [www.recyclenow.com](http://www.recyclenow.com) and look under schools - reducing food waste.

## Measure your Global Carbon Footprint

Schools Global Footprint is a teaching resource that The Highland Council supports which helps you measure and reduce the environmental effect your school has on the planet. To link to the Schools Global Footprint Tool (SGFT) go to: [www.ltscotland.org.uk/schoolsglobalfootprint](http://www.ltscotland.org.uk/schoolsglobalfootprint)

## FACT BITE

A person living in the industrial world will consume 19 times more aluminium, 14 times more paper, 13 times more iron and steel, 10 times more energy, 6 times more meat and 3 times more fresh water than their fellow humans living in the developing world.

Source Earthscan, 1992

# Reuse

The use of a product more than once in its same form, either for the same purpose or a different purpose.

## Top Reuse Tips for School:

- Have a well labelled scrap paper tray in every room.
- You could shred paper to use as animal bedding, which could be given away or sold as an enterprise project.
- Encourage pupils and teachers to bring in waste-free packed lunches and snacks. This means using refillable food containers and bottles and avoiding over-packaged foods. Fruit and vegetables work well in a waste-free lunch, as any waste can be composted! Making up your own juice or squash from concentrate in a reusable bottle not only saves waste, but can save money too!
- Reuse envelopes – envelope reuse labels can help to cover up the previous address and reseal the envelope. They are available from many organisations such as Oxfam, Friends of the Earth, Trees for Life, Centre for Alternative Technology, World Wildlife Fund and Surfers Against Sewage to name but a few. Why not make your own using the school logo?
- Use rechargeable batteries.
- Reuse containers and packaging for creative craft activities!
- Reuse plastic containers such as yoghurt pots, margarine tubs etc. during art activities for glue and paint pots.
- Set up a collection for spectacles to donate to Vision Aid. Vision Aid is an organisation that sends unwanted spectacles to developing countries to be reused. Send with a note of the details of the spectacles to: Vision Aid Overseas, 12 The Bell Centre, Newton Road, Manor Royal, Crawley, West Sussex, RH10 2FZ. Website: [www.vao.org.uk](http://www.vao.org.uk).

## Top Reuse Tips for Home:

- Unwanted clothing and household items can be donated to your local charity shops so that they can be reused.
- Ask in your local shops if it is possible to get refillable products, such as ink cartridges, lighters and washing up liquid.
- Look out for bottles of fizzy drinks in returnable glass bottles.
- There are lots of alternatives to disposable items such as batteries, razors, nappies, sanitary protection, handkerchiefs, cleaning wipes and toiletries. For further information on reusable nappies contact Highland Real Nappy Project – Tel: 0845201 2609 e-mail: [info@hrnp.org.uk](mailto:info@hrnp.org.uk) or visit [www.hrnp.org.uk](http://www.hrnp.org.uk)



# Reuse - Activities

## Let's get Creative!

Gather together a range of objects that would regularly be regarded as rubbish, such as a pizza box, glass jars, advertising/unwanted CDs, plastic bottles, match boxes etc. Get the pupils into small groups where they can sit or stand in a circle and give each group an item of rubbish. They should pass the item around, taking it in turn to come up with an idea of how the item could be transformed and used again. Some good examples to get the imagination going would be: taking an old pizza box and decorating it to make a jewellery box, making a clock with an old CD as the face, using a glass jar to store marbles or other small bits and pieces. Suggestions can be for functional or decorative reuse. Let each group have a few minutes on each item of rubbish.

If you wish to take forward any craft projects, you can borrow some books about craft from scrap from the Council's Waste Management Team to help with ideas.

## Make a trinket box from old packaging

Attractive boxes of various designs and for a multitude of uses can be made from cardboard and plastic packaging coated in a layer of papier mache. Decorate with coloured tissue applied with diluted PVA glue.

If you wish to take forward any craft projects, you can borrow some books about craft from scrap from the Council's Waste Management Team to help with ideas.



## Real nappy maths

Work out how much it could cost to have a 'real' nappy baby versus a disposable nappy baby. Using the average figures below, what is the cheapest cost possible in which a family could clad a baby in disposable nappies? What is the most it could cost using disposable nappies? How cheaply could you clad a baby in washable 'real' nappies? What is the most expensive it could be to use washable nappies? What is the difference in cost for a second child, looking at the cheaper options for both disposable and 'real' nappies? The average number of nappy changes per day is 6. A child might stop wearing nappies between 24 months old and 36 months old.

### Washable nappy costs:

Flat	£1.75 to £3.50 each
Shaped & One Size	£4.75 to £10.99 each
All-in-one	£7.90 to £14.50 each
Complete 'Birth to potty' nappy kits are also now available for around £250 - but as little as £150	

Washing at home costs £1 per week taking into account washing powder, electricity and wear and tear on washing machine. One child would need 25 – 30 'real' nappies.

### Disposable nappy costs:

The average cost of a disposable nappy is £0.20

There is now a growing on-line market in second hand real nappies. Users could recoup, say, 30% of the cost by selling them on when they have finished with them - or buying them second - hand so you could also add in this cost saving.

Useful information on comparative nappy costs:

[www.clothnappytree.com](http://www.clothnappytree.com)

[www.hrnnp.org.uk](http://www.hrnnp.org.uk)

[www.goreal.org.uk](http://www.goreal.org.uk)



# Recycle

To process an item, in order to regain materials for remanufacture either as the same thing or as part of a different product.

In order to reduce our reliance on landfill and to ensure value is recovered from waste, the Council is working towards recycling or composting 50% of household waste by 2013 - the present figure is approaching 35%. By the summer of 2012 Kerbside Recycling will have been introduced throughout the Highland Council area.

The network of Recycling Points and Centres has also been improved and expanded to allow you to recycle more of your household waste. Full details of the Council's recycling services are available on [www.highland.gov.uk](http://www.highland.gov.uk). In addition to the Council's recycling services, there are other ways that you can send your waste to be recycled, some of which are listed below:

## Top Recycle Tips for School:

- Use your kerbside recycling collection to recycle everything you can. By the summer of 2012 all schools in the Highland Council area will have blue mixed recycling bins for clean paper, cardboard, plastic bottles, food tins and drink cans.
- Compost your organic waste such as fruit peelings, tea bags and any garden waste. The compost that you make can be used to improve your soil.
- You can raise some money either for the school or for charity by recycling old mobile phones and ink cartridges. There are several organisations that you can do this with. One of these is Recycool. Visit [www.recycool.org](http://www.recycool.org) for more details.
- Consider composting your school's cooked food waste with a wormery.
- Collect used stamps and send to a charity.

## Top Recycle Tips for Home:

- Make use of your nearest Recycling Points and Centres to recycle household items such as paper, drinks cans, food tins, textiles and glass.
- Recycle household batteries with some stores e.g. Currys, Dixons and PC World.
- Many charities collect coins, stamps and postcards – e.g. Guide Dogs for the Blind, Oxfam, The Royal National Institute for the Blind, Action Aid and The Leprosy Mission
- Recycle your ink cartridges and give them to a charitable cause. The selection to choose from includes: Friends of the Earth, Red Cross, Tommy's, SSPCA and WWF.
- You can recycle your old mobile phones and give to charity – e.g. Action Aid, Child Advocacy International, Scope, Highland Hospice, Oxfam, Help the Aged and Red Cross.
- Send your unwanted computer for reuse or recycling to Reboot in Forres, Moray – call 01309 671681.  
Also visit: [www.computersforcharities.co.uk](http://www.computersforcharities.co.uk) or [www.itschoolsafrica.org](http://www.itschoolsafrica.org)
- Polyprint accept the plastic film that magazines etc may be packaged in: Polyprint Mailing Films, Mackintosh Road, Rackheath Industrial Estate, Rackheath, Norwich, NR13 6LJ.
- Unwanted CDs and DVDs not suitable for giving to charity shops can be recycled by companies such as: - Poly C Reclaimers - [www.plasticwaste.co.uk](http://www.plasticwaste.co.uk) - 0800 6191817.

## Community Recycling

There are many active community groups in the Council area operating recycling, reuse and composting activities. To find out more about your nearest organisation, please contact the Community Recycling Network for Scotland Highlands and Islands Development Officer - [www.crns.org.uk](http://www.crns.org.uk).

# Recycle - Activities

## Paper-making

You can borrow paper-making kits from the Council's Waste Management Team or you can look into making simple equipment yourself. There are a few ways which you can make your own - ranging from using an old picture frame, biscuit tin, or timber to create a frame, over which you need to stretch some fabric such as some curtain netting, tights or fine wire mesh. Once you have prepared your frame or 'mold and deckle', you need to prepare your paper and make a pulp. Tear up paper (no bigger than 4 x 4 cm) and place it in a bucket. Add 1/2 a litre of water for every 5 sheets of newspaper. Now you can either leave it to soak for a while to soften the paper, or you can go straight ahead to blending the paper with a liquidiser. Use a basin larger than your frame to hold the pulp mix.

Now you are ready to make a sheet of paper.

Dip the frame into the pulp and submerge it for 5 - 10 seconds. Lift it out of the bowl and let the water drain away from the mesh for a few seconds. Place a J-cloth over the mesh on top of the pulp and carefully tip the frame upside down and onto newspapers. Press down on the frame to allow the pulp to stick to the J-cloths then carefully lift off the frame. Leave it to dry overnight and you can remove the J-cloths from your newly made sheet of recycled paper. Petals, leaves and pressed flowers can be used to decorate the paper – just place them on the pulp on the frame before you place the J-cloth on top. Detailed instructions are supplied with the kits on loan, or visit [www.bbc.co.uk/dna/h2g2/A839216](http://www.bbc.co.uk/dna/h2g2/A839216)

## Rag rug making

You can borrow rag rug looms from the Highland Council's Waste Management Team, along with all you need to get started with weaving scrap fabric into rugs, seat cushions or wall-hangings. You will need to string the looms up for the pupils – instructions are available with the looms when you borrow them. Cut strips of fabric, which pupils can weave in and out of the wooden pegs. Once covered in fabric, the pegs can be lifted out of the block of wood and the fabric transferred onto the strings. The pegs can then be slotted back in again if more weaving is required to create the size of woven item that is desired. Detailed instructions are supplied with the kits on loan.

## Research Project

Recycling reduces the demand for raw materials. This means less mining, quarrying or logging. Many parts of the world have been blighted by mining and quarrying, which destroys the natural environment and wildlife habitats and may cause environmental and health problems for local people. Also transporting raw materials around the world uses fossil fuels and has an environmental impact. Although some materials for recycling need to be transported around the UK, the impact of this is significantly less than that of transporting raw materials from often remote locations in other parts of the world. Split the class into groups and give each group one or two materials to find out where in the world they come from, and about the different habitats and wildlife that are native to those areas. Handy hint: The Peters Atlas will be useful for this (available on loan).

## On-line Resources

There are plenty of on-line recycling games and quizzes:

- [www.ollierecycles.com/uk](http://www.ollierecycles.com/uk)  
Visit the clubhouse for a rubbish sorting game.
- [www.recyclezone.org.uk](http://www.recyclezone.org.uk)  
Visit the fun zone for games on recycling.
- [www.recycle-more.co.uk](http://www.recycle-more.co.uk)  
Several games and activities are available on this site, split into ages 5-11 and 11-16.

# Composting

## Composting is Nature's way of Recycling!

By piling fruit and vegetable scraps and garden waste in a compost bin or heap, gardeners create an ideal habitat for decomposer organisms. These micro-organisms break organic material down to form humus. In addition, the heat inside the pile from all the biologic activity will kill off many diseases and unwanted seeds. Making compost requires turning, mixing and exposing the materials to air.

A kerbside collection of garden waste is available to 45% of Highland households at present, which is hoped to rise to 66% by the end of the year. This is for garden plant waste such as grass clippings, twigs, leaves, weeds, hedge trimmings, flowers and plants. It is collected in a normal refuse collection vehicle, and is taken to a composting facility, where it is shredded and heaped into a large pile. The pile is turned using a large machine called a loading shovel, to let air mix with the garden waste. This helps the waste to rot down. As it rots it gets up to temperatures as high as 60-70 Celsius and creates rich brown-coloured compost which can be used as a soil improver.

### Home Composting

Did you know that up to 60% of the average household bin can be composted (including both garden waste and uncooked kitchen waste)? Composting is one of the simplest and best things that can be done to tackle the issue of waste. In landfill sites biodegradable materials rot down and give off the greenhouse gas methane. This is more potent than carbon dioxide, which is the gas that is created when these materials are composted. Because the recycling process takes place in situ it can drastically cut down on the amount of waste materials that have to be transported, saving on fuel. Home-made compost will improve your soil naturally, saving you money by reducing your need to buy compost. Composting can be carried out both at home and in the school grounds, using fruit peelings from packed lunches and snacks, tea-bags, paper towels, and garden waste such as fallen leaves and weeds. It is also important to know what sort of things NOT to compost – avoid adding cooked foods, meat and fish left-overs, cheese, coal ash, and cat and dog litter/poo.



To get good results with your compost, you need to put in the right mixture of materials – if you collect lots of tea-bags and fruit peelings from classrooms and the staffroom your compost maybe rather slimy! You need to make sure that you mix your 'browns' which are rich in carbon shredded paper, dried leaves, chopped woody stems, cardboard) with your 'greens' – nitrogen-rich materials such as grass clippings and fruit and vegetable food waste. In addition to adding the right materials, you should also introduce air into the compost, either by turning it using a fork, or by adding scrunched up paper and card, which act as air traps. Another aspect of your compost's wellbeing to look out for is the moisture content – like all things a balance is required between wet and dry. When compost is squeezed in your hand a few drops of water should be produced. If it is too wet cover it and add dry materials; if it is too dry add some water, or leave the lid off to let the rain in. Your compost heap will be home to lots of mini-beasts that help to breakdown the organic materials into compost. Keep an eye out for worms and other creatures living in the compost!

The Highland Council's Waste Awareness Team can offer advice on composting - and setting up a wormery. We can also bring a working wormery to your school to show to pupils - contact us on 01349 868439 or email: [recycle@highland.gov.uk](mailto:recycle@highland.gov.uk)

# Composting — Activities —

## Home and School

### Compost in a bottle

This is a great way to get a look at the composting process using empty 2-litre plastic drinks bottles as mini see-through composters. If you use one bottle between 5-6 pupils, this should be enough. In preparation for this activity, you will need to cut off the top of the bottle but not completely –leave a small section to act as a hinge. You will also need: soil, scraps of newspaper, dried leaves and cut grass, fruit and vegetable peelings, as well as a permanent marker pen and Sello tape. An optional extra ingredient to use would be some fertiliser or compost accelerator, which you would add after a layer of vegetable scraps. This may speed up the process, however you will also get results without using this. Get the pupils to add a layer of soil in the bottom of their bottles about 2-3 cm deep. Next add a layer of vegetable scraps about the same depth and cover this with a thin layer of soil. Now add some dry leaves and grass, then another layer of vegetables and a layer of ripped up pieces of newspaper. If you wish to use a fertiliser/compost accelerator, add this after the layers of vegetable waste. Repeat this layering process until the bottle is full. Now close up the bottle and tape up the opening that you made. Mark the final level of compost with the marker pen. Create a prediction sheet with the pupils, where they make a diagram of the bottle and all its layers, and make a prediction about what they think will happen to the level at the top of the bottle over the next few weeks. The pupils should record the changes over the following weeks. While you would find mini-beasts in a normal compost heap, there is no need to add mini-beasts to this experiment. The conditions in the bottle may not be ideal for them, with less space and more light than some creatures may need. While mini-beasts are important in the composting process, the waste needs to have started to rot before they can digest it. Bacteria and fungi, which are already present in the soil, will start to break the materials down during the experiment.



## Mini-beasts and foodchains

Worms and other mini-beasts are very important in the composting process. If you wish to do further work on mini-beasts 'School's Out' by the Highland Environmental Network (HEN) has a mini-beasts section and is available at [www.highlandenvironment.org.uk](http://www.highlandenvironment.org.uk) (go to projects then schools out)

## School Grounds

If you start composting at your school, you may wish to look at other aspects of your school grounds to compliment this, such as a garden area where you can use the finished compost.

The following websites are good sources of information for composting and gardening in School Grounds:

The Growing Schools Garden - [www.thegrowingschoolsgarden.org.uk](http://www.thegrowingschoolsgarden.org.uk)

Grounds for Learning - [www.gflscotland.org.uk](http://www.gflscotland.org.uk)

Highland Environmental Network (HEN) - [www.highlandenvironment.org.uk](http://www.highlandenvironment.org.uk).

## Worm composting

Composting with worms is called vermin-composting. If your school is interested in setting up a wormery, the Waste Awareness Team is happy to help and to advise. Some books are available on loan with information about how to compost with worms and classroom activities relating to worms and composting. We can also arrange a visit to demonstrate a working wormery to pupils.

## Web Resources

[www.gardenorganic.org.uk/schools](http://www.gardenorganic.org.uk/schools)

# Disposal

At present in the Highland Council area most of the waste that is not recycled is sent to a landfill site. However, a modern landfill is not just a hole in the ground which gets filled up with rubbish. It is lined at the bottom with clay and heavy sheets of plastic, which are then covered with sand or gravel so that the large vehicles which crush the rubbish don't puncture the liner. The reason that the landfill needs to be lined is because rainwater seeps through the rubbish and mixes with the waste, picking up substances, some of which could be harmful to the environment. This liquid, called leachate, needs to be prevented from leaking into soil or water. The leachate is collected and pumped to a treatment plant before it is discharged. The landfills are built up bit by bit, in sections called cells. When a cell is filled up it is topped off with a cap that stops any more rain getting into the waste and making more leachate. In addition to the liquid leachate, landfill sites also have gas waste, methane, which is produced as organic materials rot down. The Council landfill sites are operated in accordance with Pollution Prevention Control Permits enforced by the Scottish Environment Protection Agency (SEPA), which means that there are controls on leachate and methane gas management.

## Relative lengths of time required for materials to decompose.

Paper	2-5 months
Orange peel	6 months
Milk Carton	5 years
Cigarette filter tips	10-12 years
Plastic bags	10-20 years
Leather shoes	25-40 years
Nylon cloth	30-40 years
Plastic containers	50-60 years
Polystyrene & glass	never

Source: [www.dep.org.uk](http://www.dep.org.uk)

Every day, lorries with rubbish arrive at the landfill site and waste is put into the active cell. Then it is compressed by a heavy vehicle called a toothed wheel compactor. Some of the materials will break down and decompose fairly quickly, whereas others will not.

Another option for waste disposal is the production of energy through the burning of waste, Energy from Waste (EfW). Household waste is made up of a number of different materials, some that will burn (combustible) – e.g. paper and kitchen waste- and some that won't burn (non-combustible) –e.g. tin cans and glass. Before burning, as much of the non-combustible material is recovered for recycling. However even with EfW there is still ash waste to be disposed of, so landfill is still required. Gasification, pyrolysis and anaerobic digestion are other technologies that can produce energy from waste. The first two technologies involve heating the waste to a very high temperature and using the gas produced to generate electricity. Anaerobic digestion is a naturally occurring process of decomposition that also produces gas that can then be used to produce energy. Mechanical Biological Treatment (MBT) is yet another form of waste treatment. This method has a mechanical element that extracts as much of the recyclable material from the waste as possible. The remaining waste is mostly biodegradable. This can then be composted (the biological element of the treatment) and used as a soil conditioner or made into pellets to be burned as a refuse derived fuel (RDF). All of the above methods are preferable to landfill as there is some kind of end product from the process, either energy or a soil conditioner.

## Litter

Litter is described as waste in the wrong place and occurs when people fail to dispose of their waste responsibly. It is a crime to leave litter or to fly-tip with fines ranging from £25 - £20,000. Litter is expensive to deal with and it cost the Council £3.75 million in 2008/9 to keep Highland streets clean. It is also unsightly and if not dealt with can take many years to decompose. It is also dangerous - to people and animals. The Royal Society for the Prevention of Cruelty to Animals (RSPCA) staff regularly rescues pets and wild animals trapped or hurt by litter. This led to the introduction of the 'Lethal Litter' campaign. Another national campaign – Stop the Dumb Dumpers is also running, encouraging people to report fly tipping or any areas that need clearing up – telephone 0845 2304090.

Eco Schools Scotland have a topic sheet on litter with several links to other resources on litter –visit: [www.ecoschoolsscotland.org](http://www.ecoschoolsscotland.org).

# Disposal — Activities —

## Landfill Experiment

Get some clear containers with lids (e.g. take-away tubs) and half fill them with soil. Collect scraps of different sorts of materials, such as food, paper, plastic and metal. In each different container bury one of the materials, putting the scraps at the nearside of the container where they can be easily seen. Label each container with a note of which material is buried inside. Add some extra soil on top and moisten the soil. Leave some air space at the top of the container (about 3 cm). Observe the containers over at least a 3-week period. Make predictions about which materials will and will not decompose in a landfill. Then wait and see what happens to the materials in the containers, making notes on any changes.

	Week 1	Week 2	Week 3
Plastic - predicted			
Plastic - observed			
Paper - predicted			
Paper - observed			
Vegetables - predicted			
Vegetables - observed			

## Litter Campaign

Hold a campaign to tackle litter in the school. Litter 'Clean it Up' packs may be available – visit [www.ecoschoolsscotland.org](http://www.ecoschoolsscotland.org) to find out further details.

## Role Play Debate

Not everyone wants to live next door to a landfill site or an Energy from Waste plant (Not In My Back Yard - NIMBY) However our waste must go somewhere for disposal. In the Highland Council area we have already filled up one of the landfill sites, and we need to do something so that we can deal with our waste in the future nearer to where it is produced. Organise a role play debate in which there is to be a Council meeting to discuss the issue of how to solve the problem of waste disposal locally. Different view points possible are: family, school, politician, environmentalist, local manufacturing company, and local tourist industry representative. Each role should receive a couple of sentences describing why they are interested in the issue and ways that it may affect them.

**Use the table below which describes advantages and disadvantages of the two options for disposal.**

Advantages	Disadvantages
<p><b>Landfill</b></p> <p>It is relatively cheap and easy at the moment, although it is getting more expensive. Some of the gas produced in landfill sites can be used as energy.</p> <p>Landfill sites are usually existing holes in the ground resulting from activities such as quarrying.</p>	<p>When 'green waste' rots down it produces a very powerful greenhouse gas called methane. As water seeps through the waste, pollution (known as leachate) can be spread into the land and water nearby.</p> <p>Landfill sites fill up! More and more will be needed in the future, but where are we going to put them?</p>
<p><b>Energy from Waste</b></p> <p>It gets rid of lots of rubbish very quickly.</p> <p>The energy produced when the rubbish is burnt can be used to power other things.</p>	<p>The ash created needs to be buried, and can be polluting.</p> <p>Gases emitted need to be controlled and checked very carefully to reduce risk of pollution.</p>