



Glass makes up around 8-10% of the average household dustbin with every UK family using around 500 glass bottles & jars each year.



Annually, just over 2 million tonnes of glass packaging are used in the UK.



In 2000, 25% of this was recycled, a rate that is lower than the European average of about 55%. Switzerland is the European leader recycling over 95%.



Ask parents and teachers to avoid buying imported green glass (beer and wine mainly) and buy British made products in white or brown glass. You might also be helping your local economy.

The manufacture of glass uses energy, in extraction and transportation of the raw materials, and in the processing. A total of 566,563 tonnes of glass were recycled in the UK during 2000. This saved 153,000 Mw hours of electricity – enough energy for a town (4200kWhr per house per six months)

Unlike many natural resources there is no shortage of the materials used, but they do have to be quarried from our landscape. For every tonne of recycled glass used, 1.2 tonnes of raw materials are preserved.

Glass colour matters! Over 50% of all glass collected for recycling in the UK is green. Most of this glass has been imported as wine bottles. However, green bottles are not extensively manufactured in the UK and this has led to a surplus of green glass cullet (glass recycle is referred to as cullet) and a subsequent collapse in its value. In the past this has undermined the profitability of glass recycling.

The UK predominantly produces clear and amber (brown) glass and exports a lot of clear glass, in the form of spirit bottles. Because consumers are reluctant to deposit jars in bottle banks little clear cullet is produced.

Recovered glass ranges from £15-22 per tonne for green glass, £25-30/t for clear glass and £20-25/t for brown glass (October 2002).

Recently new markets for green glass such as glasphalt – a road surfacing material made from glass – have increased demand so much that there is now a shortage of green cullet.

If glass is buried in a landfill site it does not breakdown and can render land unusable.

The Producer Responsibility Obligations (Packaging Waste) Regulations 1997, which make everyone involved in the glass packaging chain partly responsible for recovery and recycling, is intended to increase the level of glass recycling and help to establish a more stable market for the cullet.



The initial target of the regulations was to recover 50% of packaging by 2001 (recovery includes recycling, energy from waste and composting).

By 2006 the UK will be obliged by European law to recycle at least 70% of glass in the packaging waste stream.

Reduce Returning bottles to the retailer and receiving the deposit in return used to be common practice. Milk bottles are one of the few types of glass packaging still reused (an average of 20 times).

Reuse There is also the option of reusing bottles and jars as storage containers for home made wine, beer or jam.

Recycle Many people set aside glass for recycling and either participate in kerb-side collection schemes or take them to a bottle bank. The first bottle banks appeared in 1977, and there are now nearly 23,000 on sites around the country, usually located at civic amenity sites and supermarkets.

To find your nearest bottle bank visit the Rethink Rubbish website. www.rethinkrubbish.com



Did you know that glass can be **RECYCLED** again and again?
Or that **REDUCING** the amount of glass we use in the first place or **REUSING** glass are even better things to do, both for the environment and your pocket?

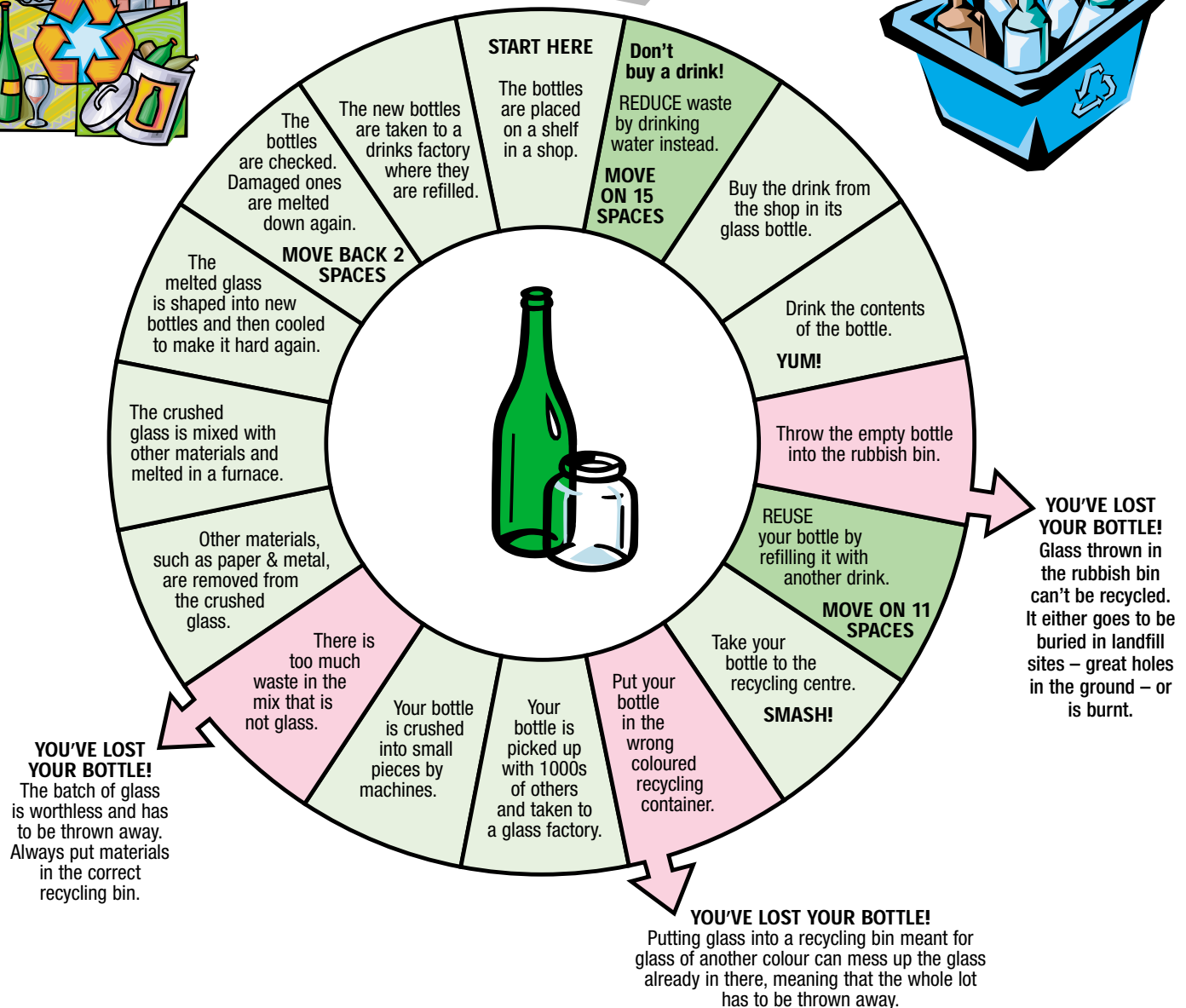
Have fun finding out about glass with this game for 2 to 6 players

How to play!

- You will need a die and one counter for each player. Why not make bottle shaped counters?
- Read round the circle before you start. Can you work out why the spaces are in three different colours?
- All start in the top space and move clockwise. Take turns to throw the die and move your counter.
- If you land on one of the dark green spaces, move on the number of spaces shown.
- If you land on one of the red spaces, you've **LOST YOUR BOTTLE** and are out of the game.
- Continue until only one player is left – the winner! How many times can you go round the circle before you **LOSE YOUR BOTTLE**?



THIS WAY ROUND →



5000BC: Glass was discovered either in Egypt or by Phoenician merchants by accident. Primitive glass forms in campfires when silica from flint, quartz or sand mixes with potash from burnt wood.

1600BC: Oldest fragments of glass discovered in Mesopotamia, showing that hollow glass had been produced there. Other glassmaking activities may have been evolving independently in Greece, China, and North Tyrol (Austria).

27BC to AD14: Glassblowing discovered in Syria. The metal tube used for blowing has changed little since then. This technique was spread by the Romans.



AD100: The Romans discovered making clear glass by adding magnesium oxide. This was used in Pompeii's luxurious houses.

11th and 13th Centuries AD: German craftsmen developed techniques for making glass sheets.

1696: Since windows allowed in light by which people

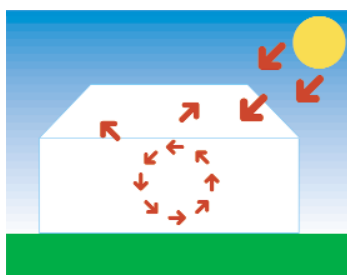
could work e.g. for textile weaving, the British Government taxed them!

17th Century: Englishman George Ravenscroft discovered adding lead oxide to glass made it reflect light better. Around this time the French discovered a method of pouring glass and polishing with sand and felt discs to make mirrors.



20th Century: Squeezing glass through rollers to make it flat allowed the technology of glass windows to evolve and led to modern double glazing!

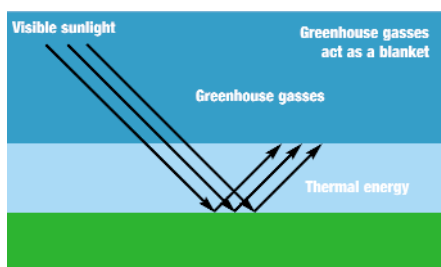
Have you ever wondered why a greenhouse gets hot? The answer is in the glass used to make up the walls and roof of the greenhouse. Sunshine, often called "solar radiation" or "insolation" is short wave radiation and passes through glass very easily. Inside the greenhouse the solar radiation heats the ground. When the ground heats up it gives off "terrestrial radiation". On a sunny day, you can see heat currents coming off the ground and bending the light. This is long wave radiation.



Long wave radiation is well absorbed by the atmosphere so it heats up the air inside the greenhouse. However, long wave radiation doesn't travel through glass easily so the energy remains trapped inside the greenhouse and it warms up. This is the greenhouse effect and is why cars get hot inside on a sunny day.

So why do people talk about the greenhouse effect in relation to the environment? Greenhouse gases (like carbon dioxide and methane) behave just like glass, allowing solar radiation into the atmosphere but reflecting back the resulting terrestrial radiation. The greenhouse effect keeps the earth warm. Without them, we would freeze!

Many people suspect that burning fossil fuels causes greenhouse gases such as carbon dioxide to build up in our atmosphere, leading to unnatural increases in the earth's temperature. This is often referred to as the greenhouse effect or global climate change.



In many parts of Europe and the US refillable glass bottles were the most common way to buy soft drinks and beer right through the 1950s and 1960s with the consumer paying a small deposit for the container which was refunded upon return. Gradually over the decades the use of "one-way" no-deposit containers, such as metal cans and plastic bottles, began to take over from the returnable glass bottles. In the US one-way containers used in the soft drink market grew from just 5 percent in 1960 to 47 percent in 1970 – such a huge increase certainly had an environmental impact in the amount of litter produced alone.

Society was moving towards a more mobile and convenience orientated lifestyle. Beverage manufacturers saw that the use of non-returnable drinks containers was more suitable to this lifestyle and they could also cut the costs of transporting and washing the returnable bottles.

Once the negative effects of the use of disposable containers began to be documented many groups called for bottle legislation to be introduced, ensuring a return to the refillable system. These "bottle bills" were intended to reduce drinks container litter, to conserve natural resources through reusing and reducing the amount of waste going to landfill. Along with many US states a number of European countries have effective bottle legislation including Denmark, The Netherlands, Germany and Finland.

This activity can be performed as a debate or a role play with assigned roles.

The topic: Should the UK introduce returnable bottle legislation?

Arguments supporting bottle legislation:

- environmental benefits such as litter reduction, less greenhouse gas produced by energy production and waste disposal, saves water.
- job creation through reuse and recycling.
- reduced cost to the taxpayer for litter collection, recycling and waste disposal.
- polluter pays principle. The legislation shifts the cost to the producers and consumers of drinks containers, thereby ensuring that the industry that creates a wasteful product is responsible for the disposal or recycling of that product.



Advocates of bottle legislation: Environmentalists, local council departments responsible for litter collection and recycling, concerned consumers

Arguments opposing bottle legislation:

- higher price to consumers due to the increased costs to manufacturers, distributors and retailers.
- reduction in sales and job losses in the container manufacturing industry.
- council recycling schemes are a more effective means of reducing waste and enable councils to benefit from the sale of glass, plastic and aluminium cans to recyclers.



Opponents of bottle legislation: the beverage industry (drink container manufacturers, soft drink manufacturers, distributors), retailers selling drinks, some consumer groups.

Useful website links:

- www.bottlebill.org/Environmental/Litter/litter.shtml
- www.grm.org/beverage/refillables/introduction.html
- www.environment.sa.gov.au/epa/pdfs/is_no20.pdf

National Curriculum Links:

KS 4 Citizenship 1, 2 & 3

All the information you need is out there on the internet – somewhere! We tell you where to look.



British Glass

www.britglass.co.uk

The website of the British Glass Manufacturers association. This site promotes the use of glass, explains how it is made and its history. The site actively promotes the recycling of glass, explaining why we should recycle and the process of recycling glass.

Glass Pac

www.glasspac.com

This site outlines commercial & environmental reasons for choosing to use glass for packaging. It has diagrams and descriptions of the recycling process and gives details of packaging legislation.



Recycling Works

www.recycling-works.co.uk

A directory of materials, including glass, required across England for reuse & recycling with a facility for advertising materials that are available within individual organisations.

Waste Online

www.wasteonline.org.uk

This Waste Watch website provides facts and statistics about glass and provides information on legislation, packaging and waste management. This site also explores the

benefits of returnable bottle schemes as an alternative to recycling. There is also information on other materials and waste management issues in general.



Waste & Resources Action Programme

www.wrap.org.uk

Provides information on new and innovative technology relating to glass recycling and possible markets to use recycled products. The website also contains publications and reports on waste issues.

Focus on Denmark

- Location** Denmark is in Northern Europe, on a peninsula north of Germany
- Population** 5.5 million
- Capital** Copenhagen
- Geography** Low and flat with gentle rolling plains
- Waterways** The inland waters in Denmark (the Skagerrak, the Kattegat and the Belts) create a shallow transition between the oceanic North Sea and the continental Baltic Sea.



Denmark and the glass bottle

Until the mid 1990s Denmark only allowed drinks to be bottled in glass. There was a nationwide ban on the use of plastic and metal drinks containers. Danish legislation also meant that glass bottles had to be designed to be reused, and that drinks manufacturers had to use one of a limited amount of bottle designs to make reuse economically viable. Consumers paid a returnable deposit on every bottle bought. The system was an amazing success with a 98% return rate, with each bottle being reused over 30 times.

In the late 1990s after plastic bottle packaging had been allowed, manufacturers started introducing many different bottle types. Consequently, shops demanded payment to cover the extra costs involved in sorting all the returned bottles. Meanwhile, the “can ban” was rescinded though there was still a deposit payable on plastic and metal drinks containers in order to maintain the incentive to reuse glass bottles. After much deliberation the Danish government formed a company with the sole rights to all bottle and can recycling – the Dansk Retursystem.

Dansk Retursystem has been a great success and has provided return systems for all types of packaging – whether they will be reused like the glass bottle or recycled like plastic packaging. The company is well on the way to achieving its aim of a 95% collection rate of disposable packaging. Dansk Retursystem is a non profit making organisation and any profits are donated to charity.

Recycling Glass

www.recyclingglass.co.uk

This educational site by British Glass provides simple facts about glass. There is a chance for pupils to have pictures they have drawn put on the website, do a quiz and receive a certificate. Teachers can order a free copy of a CD ROM featuring resources for key stage 1 and 2.

Let's Recycle

www.letsrecycle.com/glass

This site includes up to date articles concerning glass recycling and details current market prices, glass-makers, reprocessors & who to contact in your area to find out about recycling schemes

Recycled Products Guide

www.recycledproducts.org.uk

An online database packed with information regarding companies using recycled glass in the manufacture of their products.

Recycle More

www.recycle-more.co.uk

This site provides useful resources for individuals, schools & businesses. It also includes a directory giving details of locations of bottle banks in the UK.