

Part of the Climate Science Outreach Project



SCHOOLS FIGHT TO GO GREEN



LOOKING TO FUTURE TECHNOLOGIES

STUDENTS TAKE ON CLIMATE STORIES



...AND SHEEP POO!



JUNE 2012

[illegible]

JUNE 2012

Welcome

from the Climate Science Outreach team.

Our contributors

Widnes

Catalyst Science Discovery Centre

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Blacon High School (p 102)
The Catholic High School, Chester (p 16)
Hawarden High School (p 24)
Neston High School (p 52)
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Bristol

At-Bristol

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Production

Sustainable Paper – Cocoon Silk is produced from 100% or 50% post-consumer recycled, FSC certified pulp. Less energy and water are consumed and fewer CO₂ emissions are produced during manufacturing, compared to the production of virgin fibre paper.

FSC recycled certification, NAPM 100% recycled certification, ISO 14001, Process Chlorine Free (PCF) and PAS 2020:2009 Level 3.

In autumn 2011 students representing secondary schools from across the UK were set the challenge of becoming science journalists. They spent three months researching the issues, investigating the facts, interviewing the experts and gathering photos to report on the climate change stories from their local area.

The result is a range of stories covering everything from community recycling initiatives to the use of sheep poo as an energy source for the future. The range of stories investigated by our reporters highlights the impacts climate change can have on the lives of young people across the country. You can read all of their stories in this special edition of *ATMOS*, which is for all those who took part in the Climate Science Outreach Project.

The Climate Science Outreach Project is part of the Science Museum's Climate Changing programme. To find out more, please visit our website:

www.sciencemuseum.org.uk/ClimateChanging

Foreword

When I look back at the thousands of articles I have written over the past three decades, among the few that really stand out is the dramatic call to arms by US scientist Jim Hansen in 1988 that helped raise awareness of global warming, and warn us of the dangers of climate change.

This now promises to be the biggest story of the 21st century, one which will affect societies, ecosystems, economies and individuals on an epic scale. We're entering a new era in Earth's 4.5-billion-year history: the Anthropocene, or the 'age of man'.

But the climate system is complex, as are climate politics. Yet despite the urgency of the issue there's a danger that the public are getting blasé about global warming, so the need for journalism that combines informative reporting with human interest in polished prose has never been greater.

That's why I am so impressed by *ATMOS*, where 12- to 14-year-olds have generated the ideas, conducted the interviews and written the stories. This exciting initiative demonstrates how young people are engaged and can engage us all – helping us to sort fact from fiction and ignite discussion in order to understand the defining story of the Anthropocene.

Roger Highfield, science writer and journalist, Science Museum Director of External Affairs

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A blue-tinted image of a Mercedes-Benz F-CELL car, viewed from the front quarter angle. The car has "F-CELL World Drive" written on the windshield and "www.facebook.com/mercedesbenzfc" on the side. The license plate area says "F-CELL".

Technology

Can the latest technologies offer a solution to the problems of climate change?

A BUILDING THAT PROVIDES 8% OF ITS OWN ENERGY.
A BUILDING THAT HELPS REDUCE CLIMATE CHANGE.
A BUILDING THAT IS CALLED STRATA.

STRATA:

■ 'It's ugly and a monstrosity.'

As we know, fossil fuels are running out and global warming is becoming a bigger issue than ever before. Here in Britain we have realised we need another way of supplying energy without causing as much atmospheric damage. And that is why renewable sources of energy were developed. Renewable energy, in case you don't already know, is an alternative way of producing electricity in a clean, efficient manner that never runs out, hence it is called 'renewable'. However, despite advances in renewable energy production, much of Britain continues to be powered by fossil fuels. But we, Sacred Heart Roman Catholic Secondary School, have seen a building that is different from the others.

keeping with the surroundings as it looks more modern than all the old Victorian bricks.

However, not all views on Strata are negative, as some people see the true purpose of the building and realise it is a really good idea. The building has incorporated sustainability into a residential apartment building. By doing so, it has raised awareness about climate change and the need for society to behave more sustainably. Furthermore, the building has been recognised positively, winning a prestigious Concrete Society Award in 2010, with judges commenting on the striking nature of the building and its excellent use of

waste, equity, water, materials and social wellbeing factors.'

To conclude, we think Strata is a good idea and more buildings should be made like this, as it is an asset to sustainability and has made many people publicly aware of renewable energy. However, there are some aspects that could be improved. These include making it more aesthetically appealing and enabling the turbines to capture the wind's energy from every direction. Another vital factor to improve the building would be to thoroughly insulate it, as this is one of the best ways to reduce energy consumption, according to Andrew Haigh.

THE SUSTAINABILITY STARTER?

Strata is a 148-metre-tall skyscraper that dominates the skyline of Elephant and Castle, and it is London's first with wind turbines embedded into it. These turbines provide a renewable energy source, thus reducing climate change as less fossil fuels are being burnt. The design of the building allows the turbines to spin freely when the wind is in the right direction, but they can also be turned off completely using a fail-safe switch inside. This building was part of a £1.5 billion project to regenerate the whole of Elephant and Castle and alone cost £113.5 million, taking three years to complete.

Although the building is supposed to produce 8% of its own energy, some people think the renewable energy aims of the building come at an aesthetic cost. A local community warden apparently exclaimed, 'It's ugly and a monstrosity'. Strata was notoriously rejected appearance-wise when it won the 2010 Carbuncle Cup for being 'the ugliest building in the UK' of that year. Some people think that the building is not in

space within a restricted area. Plus, one resident we spoke to felt, 'It is a good idea as it will have its own power source if a blackout occurred.' A librarian from Newington Library also said, 'I don't think it's unattractive, I think it actually helps the world.'

So, what do the experts think? Andrew Haigh of architects Foster + Partners (not the designers of Strata), pointed out that 'the problem with wind energy is that it is intermittent and it comes from all possible directions. It is difficult to design wind turbines on a building so that they will catch this full range of wind.' Despite this, he also said, 'The building has proved successful in that it has got people talking about renewable energy and sustainable design, and more people need to start thinking about this.'

He also pointed out the importance of social and economic factors in sustainable design: 'You must always think of sustainability holistically. It encompasses not just energy efficiency, but also a wide range of other issues such as culture, ecology, transport,

We think that if all improvements are put into action, that Strata will not be socially rejected and will raise awareness within society to help reduce climate change. An important part of this is doing the little things, such as not leaving the tap on when brushing your teeth, not leaving your TV on stand-by, walking to school and recycling. Strata has managed to use an efficient way of supplying its own energy and that in itself is why we think it is so amazing. Well, that's our view on Strata, how about you?

'IT HAS GOT PEOPLE TALKING ABOUT RENEWABLE ENERGY AND SUSTAINABLE DESIGN, AND MORE PEOPLE NEED TO START THINKING ABOUT THIS.'

Time is running out – time for new ideas



Fossil fuels – oil, gas and coal – will not last for ever

Affordable housing

There is a long waiting list for people who need a house that they can afford to rent or buy. We wanted to explore how we could change the way we build new housing to help save energy. We asked local scientist Richard Dacosta what he thinks:

Ask a scientist...

What do you think about the new housing being built?

'There are not enough and the designs are always the same – we need to think about buildings in a different way.'

What can we do differently?

'We could build homes out of wood with lots of glass to use the Sun's energy and insulate them to stop heat loss.'

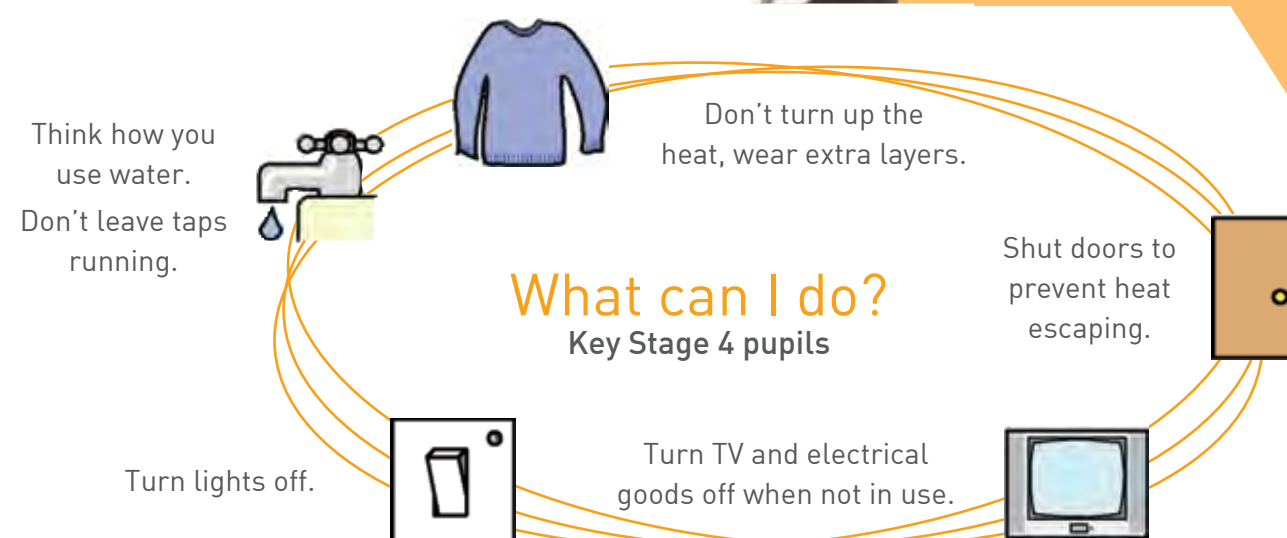
'I want to be able to have a place to live when I leave university. Will there be enough affordable housing for people like me?'

Tom Simm, student



'By thinking about different types of insulation we can stop energy escaping.'

Richard Dacosta, scientist



South facing is the way we should be looking



'No matter the climate or region, passive houses stay at a comfortable temperature year round with minimal energy inputs. Such buildings are heated passively – making efficient use of the Sun, internal heat sources and heat recovery – rendering conventional heating systems unnecessary. The extremely well insulated and airtight building envelope dramatically reduces the effect of temperature change. Passive houses are prized for their high indoor air quality.'

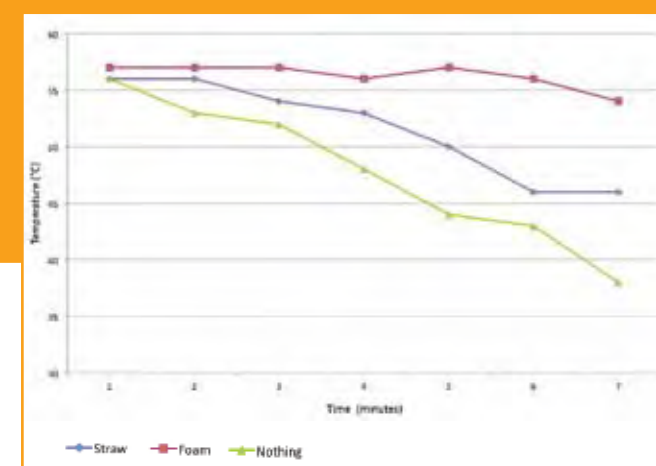
Moray Mackay, York-based architect

Don't let energy escape!

Which insulation should I choose?

Scientists at Applefields School have recently conducted a series of experiments to investigate the benefits of different types of insulation.

A model house was constructed in such a way that different types of insulation could be inserted into the walls, windows, floors and roofs. The heat lost from beakers of hot water (representing central heating) over a period of time was charted using an electronic 'leak detector'. Initial experiments performed outside showed that different types of wall insulation had a major effect on preventing heat loss.



The model house insulated with different materials.

Insulation is the key

The results from the latest research show that materials that trap air are more effective insulators and will keep the heat in during winter and out during summer, so saving the energy needed to heat homes and keep them cool.



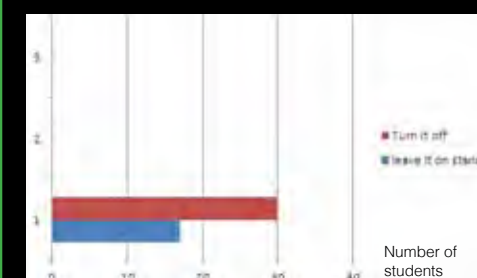
FULLY CHARGED

Most people nowadays have hi-tech gadgets like mobile phones and laptops. Are they contributing towards environmental problems? Children as young as 8 are getting laptops and mobile phones, and 65% of the people that own electrical items like these leave their chargers on throughout the day, which is making power stations generate more electricity which damages the environment.

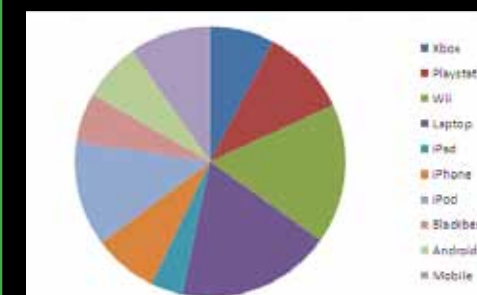
Did you know...?

Over 66 million Xbox consoles have been sold worldwide!
Over a quarter of all adults and half of all teenagers in the UK own a smartphone!

We gave a survey to pupils in our school asking about how they use their technology, and the charts show our results.



If you have a console, do you leave it on stand-by or turn it off?



Which of these consoles or devices do you own?



HYDROGEN: fuel of the future

Is the solution to global warming... the fuel cell?

Fuel cells are a type of electric cell. They do not need recharging or replacing like normal batteries. Instead they have a fuel tank which needs refilling now and again.

Brussels, Belgium, 10 January 2012: Mercedes-Benz B-Class Fuel Cell World Drive concept car on display during the 2012 Brussels Motor Show.



A fuel cell reverses the electrolysis of water, producing electricity through the chemical reaction of hydrogen and oxygen to turn an electric motor and power the vehicle. Fuel-cell electric vehicles produce no CO₂ or any harmful emissions whatsoever. Honda began road testing fuel-cell electric vehicles in 1999, and in December 2002 delivered fuel-cell electric vehicles to both the Japanese Cabinet Office and the City of Los Angeles.

The fuel cell will compete with many other energy-conversion devices, including gas turbines in power plants, the petrol engine in your car and the battery in your laptop. Combustion engines like the turbine and the petrol engine burn fuels and use the pressure created by the expansion of the gases to do mechanical work. Batteries convert chemical energy back into electrical energy when needed. Fuel cells should do both tasks more efficiently. A fuel cell provides a DC (direct current) voltage that can be used to power motors, lights or any number of electrical appliances. There are several different types of fuel cells, each using a different chemistry. Some types of fuel cells work well for use in stationary power generation plants. Others may be useful for small portable applications or for powering cars.

Honda has been developing its hydrogen-powered car, the Honda FCX Clarity, for a number of years now. The car has so far only been released under a limited leasing programme, and the company does not currently have an estimate when it will start mass-producing the hydrogen-powered car. However, this doesn't mean that the company cannot start using the technology it has developed for the car in other cars right away.

Part of the reason for the delay in mass-producing hydrogen-powered cars has to do with the high cost of some of the parts such as the hydrogen fuel cell.

With a hydrogen fuel cell, the endgame is to make electricity, and to get that electric current from inside the cell to the outside where it can do useful work. The nature of electricity requires that the current flows from inside the cell through a load (the electric motor that powers a vehicle) and returns to the cell in order to complete the circuit. Fuel cells require both hydrogen as the fuel and oxygen (to complete the chemical conversion) from the atmosphere to operate.

Despite their modern hi-tech aura, fuel cells actually have been known to science for more than 150 years. Though generally considered a curiosity in the 1800s, fuel cells became the subject of intense research and development during the 1900s.

Disadvantages of the hydrogen fuel cell

- They use hydrogen, which is a very flammable gas.
- Storage on a vehicle would be too large for a car because the hydrogen gas is difficult to contain, so most methods would add a lot of weight to the car.
- Hydrogen is a fairly rare gas in our atmosphere, therefore it has to be extracted and this process would cost a lot of money.
- Liquid hydrogen can sometimes freeze air.
- Sometimes if there is too much pressure in a cell it can cause it to explode and there is not yet a way to try and stop this happening, but people are trying to overcome it.
- Fuel cells are very expensive at the moment.

Advantages of the hydrogen fuel cell

- They are a lot more energy efficient and are less polluting than petrol-fuelled vehicles.
- They have a simple construction, so mass production would become very low in cost.
- The fuel cell produces no greenhouse gases or other air pollutants.
- The only product of the chemical reaction is water vapour and a small amount of heat.
- It runs quietly.

THE GREEN GIANT

AIRBUS A380



Local environmentalist Richard Ives outlines some of the issues surrounding air transport as he sees them, and then Airbus responds.

Richard Ives is an experienced local environmentalist who has worked across the globe supporting green issues. He has worked extensively with Earthwatch in the Seychelles to protect flora and fauna and has taken part in expeditions to Asia and Africa. His next major expedition is to the heart of Borneo to study its unique and delicate ecosystem.

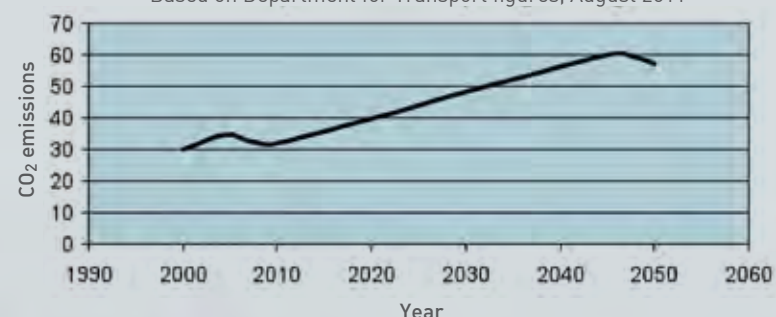
Richard highlights below some of the key issues which concern environmentalists:

- Air transport is growing fast, with emissions set to quadruple between 1990 and 2050.
- High-altitude emissions are far more damaging to the atmosphere than sea-level emissions.
- There is not a level playing field in taxation terms. There is no tax currently on aviation fuel. This encourages low-cost short-haul flights for which there are alternatives.
- Increased efficiency of aircraft is wiped out by increasing demand.

Airbus, global leader in aircraft manufacture, is a huge local employer manufacturing the world's largest airliner on our doorstep in Chester.

SO WHAT'S THE PROBLEM?

UK aviation carbon dioxide forecast in millions of tonnes
Based on Department for Transport figures, August 2011



Did you know...?

- Six thousand Airbus aircraft will come out of service in the next 20 years. This represents about half of the world market. Eighty-five per cent of the aircraft is metal and can be recycled.
- The most difficult part of an aircraft to recycle is the interior, seats in particular, because of the flame retardants used in manufacture.
- Until recently, most aircraft were not recycled, but simply parked up and left to rot.



AND HOW DOES AIRBUS RESPOND ON BEHALF OF MANUFACTURERS?

Airbus employs 6500 people directly in our local community and brings billions of pounds into the economy. It manufactures wings for the A380 series, together with the Hawker corporate jet, at its factory at Broughton, just outside Chester. The manufacturing facility is currently preparing for the introduction of the A350 aircraft, which uses carbon-fibre technology rather than traditional aluminium alloy construction methods.

Nineteen students from the Catholic High School, Chester visited the factory to see if they could find out answers to some of Richard's concerns.

An environmental spokesperson for Airbus gave students an overview of Airbus's environmental philosophy and detailed the ways the company is responding to the social and environmental issues raised by Richard.

Aviation contributes just 2% to man-made carbon dioxide (CO₂) emissions.

Over the last 40 years we (the aviation industry) have reduced CO₂ by 70%.

An A380 aeroplane uses less than three litres of fuel per passenger per 100 km – which is better than a family car.

The A380 is the company's greenest aircraft yet, in terms of emissions assuming optimal loading and usage. Airbus pointed out that the actual impact depends on how the aircraft is used. The company is committed to a full-life-cycle approach to its products, minimising not only the operational carbon footprint of its aircraft but also environmental auditing of the manufacturing process and end-of-life recycling. Every aspect of production and use is subject to an environmental risk impact assessment.

Operating CO₂ emissions are reduced by efficient design, which lowers energy consumption, and by developing biofuels with virtually no CO₂ emissions. Design efficiency is achieved through lighter, larger aircraft and, in the future, through novel ways of flying that require less fuel.

New materials require less energy to manufacture and will allow more complete recycling. Currently, 85% by weight can be easily recycled.

Airbus ensures that all new facilities reduce environmental impact through use of solar power, water harvesting, combined heat and power, and using biomass where feasible.

WHERE ARE WE?

All in all, the aircraft industry aims to meet the bulk of concerns about operational CO₂ emissions as it moves towards zero-emission fuels such as biofuels and hydrogen. It is endeavouring to meet the challenge of 'as green as a train' and is working flat out to reduce the impact of the manufacturing process.

The future looks Jolly for the Green Giant.

Q Do you know what the turned-up bits on the wings of modern planes are called and what they are for?

A These are called 'Sharklets' and reduce turbulence at the wing tips. Sharklets combined with new engines on the A320neo aircraft also reduce fuel consumption by about 15%.

Plug in your phone, plug in your car

With petrol resources running out, soon it will be time for car-owners to decide whether they are going electric or hybrid. Over the next 50 years, people will begin to switch to more sustainable energy sources, like solar or wind power. This change will also affect what our cars run on. Most environmental experts think that in the future our cars will either use electricity or have a hybrid engine.

HYBRID



Our opinion

We think that hybrid cars are better because they are good for long journeys and are a mixture of petrol and electric engine. They are also more reliable than electric cars. Unfortunately they do produce carbon dioxide, but not as much as an all-petrol car. The electric car is good for little trips around town, but some hybrids use electricity up to 30 mph, with the petrol engine taking over at higher speeds. Most city driving can be done below 30 mph. An electric car could be a feasible option if you lived in a large city and used the train to travel larger distances. For overall reliability and flexibility of use the hybrid is better in our opinion.

'Most of the raw materials for batteries come out of China... where probably the next leap of technology will come from.'

Andrew Wood, Volkswagen



Hybrid

FOR:

- Hybrid cars are powered by both a battery and a petrol engine.
- They don't need charging points.
- In some hybrid cars, the battery can be charged up from a plug, but they all can recharge the battery when using the petrol engine or when braking, like a dynamo.
- BMW will put satnav in its hybrid cars that will plan routes for the best efficiency.

AGAINST:

- Hybrid cars still use petrol – a fossil fuel.
- They still produce carbon dioxide.
- The technology is not cheap.

Fully electric

FOR:

- If the electricity comes from a renewable source, fully electric cars are as close as you can get to emitting zero carbon.
- They cost less than hybrids.
- They do not use fossil fuels like petrol.
- Carbon emissions are zero when driving.
- Warranties can last for up to 8 years.
- They can be charged from a socket in your house, which is cheap – between £1.50 and £3.00 for a full charge, depending on the time of day and size of the car.

AGAINST:

- Fully electric cars take a long time to charge, up to 8 hours.
- They have a limited range of 30–90 miles. It would take three days to get from London to Manchester.
- They still cost a lot of money.
- Producing the cars uses non-renewable energy sources.



'Electric vehicle battery range supersedes many drivers' everyday average mileage and in the long run [electric engines could be] far more affordable than your regular combustion engine.'

Katherine Wong, Customer Relations Consultant, Renault

Recycling for England

Recycling is very important right now in life, especially because we are slowly running out of supplies. That is why we need to start recycling now or we will be part of destroying Mother Nature.

Before you do any recycling though you've got to make sure you know what to put in the bins, because one wrong item could jam the machine, and imagine if your parents were getting the bill.

The most important thing is to separate your waste. Check out your local recycling rules so you know what to put in each bin.

Separating the items

The machine that does all the separating in Manchester is called the MRF, which stands for Material Recovery Facility.

Before any recycling can be done everything needs to be separated. Everything that can't be recycled needs to be removed and each material that is needed is grouped together.

Glass

The glass has to be smashed with a massive hammer. The glass pieces then fall into little holes on the conveyor belt. The glass is then collected and sent off to another factory to be melted.

Plastic

Clear plastic bottles have to be separated from coloured bottles. They do this by shining a light through the bottle. If the light goes through, a computer detects this and pushes the bottle away with a blast of air.

Metal

Before you put any metal in your bin you've got to know what kind of metal to put in. You can only put tin, aluminium and steel cans in the recycling bins; the rest you must give to the scrapyard. The steel cans and tin are separated with a massive magnet. But the aluminium, which isn't magnetic, is separated by an eddy current separator that uses the properties of electromagnets.

Residual waste

Residual waste is the name for waste that is not needed and usually this gets landfilled. However it is now possible to digest the waste using bacteria. The bacteria come from cow poo and are very useful because they eat the waste and then let off methane gas that is stored and converted into electricity.

Wordsearch

R	G	Q	R	S	W	N	W	P	N
K	E	U	E	K	Q	J	P	A	G
B	E	T	E	G	S	E	G	P	Q
I	S	H	T	G	A	S	T	E	Q
N	R	M	C	I	K	B	A	R	C
C	I	T	S	A	L	P	R	L	B
W	T	W	V	W	I	W	A	A	G
D	E	L	C	Y	C	E	R	I	G
Z	V	D	I	X	O	N	Z	N	I
N	J	W	A	S	T	E	N	M	O

- Bin
- Garbage
- Glass
- Litter
- Paper
- Plastic
- Recycle
- Waste



Fact file

- Plastic bags shouldn't be put in the recycle bins because they break the MRF machines.
- Human and animal waste is used to break down residual waste.
- Wire coat hangers should be taken to the metal recycling centre and not put in the recycling bins because they break the MRF machines.



Are we faced with a climate change disgrace?



Students from Norton Hill School have been researching local organisations dealing with climate change issues in the mid-Somerset area. This is what they discovered...

Biofuelling the nation

Fossil fuels are one of the most commonly disputed topics in the world. We are choking our planet in toxic fumes, but in Midsomer Norton we have a solution.

Local company Biosulis is striving for a carbon-neutral area. By taking used cooking oil and turning it into biofuel, it is cutting down on net carbon emissions and also stopping the 2 million tonnes of waste oil that go to landfill sites and sewers every year. Adding methanol and potassium hydroxide turns the oil, via a catalytic reaction, into a fuel usable by car engines.

The fuel is relatively cheap to produce and is currently sold at 10p a litre less than regular fuel. Fossil fuels are quickly running out, but if we keep growing crops Biosulis can keep making the biodiesel. Most diesel cars can run off this fuel, and it is still very similar in performance to regular diesel. Diesel Dan, the boss of Biosulis, sells his biodiesel to places all over the Southwest. In fact, he states that 'I have the customers, but I don't have the resources to meet demand.'

Biofuel could be the future, but if it is to happen we need the whole community helping; people can only do so much by themselves.



Diesel Dan – super fuel man.
This man is taking on climate change.
Are we all behind him?

Bees mean business

Bees... six-legged insects that pollinate our world. Funny to think, in the words of Albert Einstein, 'If the bees disappeared off the surface of the globe then man would have only four years of life.' Funny, but true...

Local farmer James Francis explains: 'Without them, my crops cannot be pollinated. No crops, no food.'

Recent studies show that, out of 100 crop species, 90% of them provide the world's food and 70% of them are pollinated by bees. Consequently we would lose 70% of the crop food we eat today. Couple this with the predicted global change in weather and we could be heading towards a future deprived of bees.

Local farmers such as Mr Francis are trying to make a difference in order to save the bees. His recent pledge is to reduce the use of insecticides and plant high-pollen-level plants. Beekeepers are also requesting the use of fields for beehives, in the hope of resurrecting the bee kind.

Can the Southwest impress and give inspiration to save the bees?

Chart showing the percentage of the world's plants that need honeybee pollination



- Plants needing pollination
- Plants not needing pollination

It's a fracking nightmare...

A new way of finding oil, fracking, has been proposed on the Mendips. To find out more we interviewed local expert and councillor Nigel Taylor. He explained that fracking is when they use machines to drill several feet into the ground, then send shocks through the earth, creating cracks which water is forced in. This breaks up the oil, which is then pumped to be processed. Being a member of the AONB (Area of Outstanding Natural Beauty) committee, Nigel realises we do not want drills in the Mendips; the aesthetics should not be spoiled. Fracking will provide jobs for the community – workers, scientists and engineers – but in the short term only. Specialists are the jobs which will remain. Tourism could fall because people will not want to camp in the hills. Shops will gain originally from increased commerce, but not from oil. Nigel worries it may harm ecosystems because the caves contain water that feeds reservoirs and local drinking water. If they are not careful the chemicals could contaminate this water, which would then be out of use for years. He cannot be sure to what extent it will be taken, it all depends on the oil companies.

It is clear Nigel thinks this is a bad idea for the Mendips. He understands that we need alternative ways of finding oil/energy, but if we adopt a method that is not yet completely safe we could ruin the land for generations to come. We think that although this is a very clever way of collecting oil the results could be devastating to such a beautiful natural landmark.

Councillor Nigel Taylor, explosives engineer.



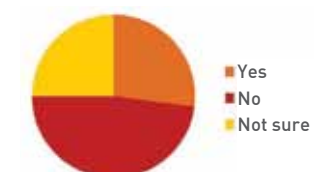
Q1. Are you aware of global warming and climate change?



Q2. Have you made changes to your life because of climate change?



Q3. Are you worried about global warming?



Q4. Do you think it is important to learn about global warming and climate change?



Are teens on nature's team?

We ran a survey to challenge this question. This survey was given to 150 students in Year 9 at Norton Hill School.

We were surprised with the outcomes, especially questions 3 and 4. As you can see, questions 3 and 4 contradict each other. The response shows us that a shocking 48% of pupils are not worried about the effects of global warming, however 51% think that it is important to learn about global warming. Why do the students want to learn about global warming if they don't feel that it is anything to be concerned about? We believe this is because they have not been educated properly enough to feel worried about it, but with our results we know that many are keen to learn.

Going solar to save our pool



A pool in the local area of Bath and Northeast Somerset has recently been having financial trouble. Paulton Pool once thought they would have to close after heating the pool became too expensive. However, there may be a solution which not only benefits them, but the environment as a whole – heating the pool using a natural resource: sunlight. The staff don't actually own the pool, which means they had to get clearance from the local council. After they got the 'thumbs up' only one thing stood in their way: money. However, they did manage to get a grant. They have a budget of £25,000 and the panels in total produce 22,000 kWh and will help them save over £4000 a year. Any electricity that the pool produces which isn't used to heat the pool is then sold back to the grid for a satisfactory income. 'It has been looking like closing down for a few years and they needed a way to cut down on costs. The roof faces south to get maximum sunlight. It's fantastic for the environment and is primarily pushed by saving money,' says Miss Gray, a Paulton Pool trustee. Look out for the changes taking place soon!

Eco-friendly engineering

Airbus

Airbus are an extremely successful aeroplane manufacturing company. Their products are much modernised using materials that are very hi-tech but also very good for the environment.

- When making the aeroplane wings, Airbus use pressurised air to insert and fix the nails and rivets into the wings instead of using an electric drill.
- They use more environmentally friendly painting processes.
- They take steps to lower energy and water consumption during the production cycle.
- When producing the aeroplanes, the current way is to produce quieter and more fuel-efficient aircraft.
- The A380 is a new benchmark for fuel efficiency and low noise levels and aircraft such as the A350 XWB will push this even further.

Technological innovation has reduced aircraft fuel burn and emissions by 70% and noise by 75% in the last 40 years. Of all man-made CO₂ emissions, the aircraft industry contributes 2%, which may not seem a lot, but it is.

The A380 XWB has probes that detect gusts ahead of the wing and set up movable surfaces for an easier glide through the air. This reduces the amount of fuel needed and therefore the amount of CO₂ emissions. This and other technological advances are devised by imitating nature, an idea named 'biomimicry'.

Airbus created a scheme called PAMELA-Life which has, since being started in 2005, brought the amount of the aircraft's parts that can be recycled, reused or recovered up to 85%.



We spoke to Ross from the Airbus factory in Broughton to find some more information about what other sorts of things Airbus are doing to be eco-friendly.

What are you doing to combat the effects of your planes on the environment?

'There are various different projects that we are working on to try and make the planes as environmentally friendly as possible. We are also developing various biofuels in the hope of achieving this as well.'

What new environmentally friendly components have been produced?

'Carbon fibre is being used for its durability, flexibility and strength.'

How much of a priority is protecting the environment to your company?

'Our company is looking to be more sustainable and working on more environmentally friendly aircraft. We are also very competitive in trying to be the most environmentally friendly aircraft company in the world.'

How can you see what you produce progressing in terms of how it affects the environment in the near future?

'We have started to use algae and plants as biofuels in the hope of producing less carbon dioxide.'

Toyota

Toyota is a highly successful car company from Japan. It is the first car company to produce a vehicle that combines the engine properties of the electric car, which runs solely on battery power, and the standard petrol car. This is called 'hybrid' technology.

The combination engine is used at different times in a journey, depending on the type of traffic the car is driving in. The petrol engine is used when the car is in high-speed or high-mileage areas and the electric motor is used in towns or cities and when the car is moving in slow traffic. This works incredibly well to reduce carbon dioxide (CO₂) emissions.

Although there are a lot of benefits of the hybrid in comparison to the normal car, it is over £4000 more expensive. The cheapest hybrid car is £18,500.

The first car with built-in hybrid technology was produced 15 years ago. This was the Toyota Prius. The hybrid technology is something that could inspire new projects for protecting the environment:

- Home-charged cars
- Fully electric cars
- Cars that use hydrogen and only release water

These all could be technological advances of the future.

One advantage of owning a hybrid car is that in some car parks there is no charge for parking a car with hybrid technology, as an incentive for buying the car and saving the environment.

We interviewed Steve from the Toyota factory in Deeside to find out some more about how Toyota is doing more to protect the environment.

What are you doing to combat the effects of your cars on the environment?

'We are looking into many things such as emissions, transmissions and gearboxes. And our dream, as a company, is to make a car that in some way cleans the air as the car passes through it.'

How effective are these changes?

'These changes have made an enormous improvement to the state of the environment.'

Is aiding the environment beneficial in terms of profit and loss?

'We do claim some profit. But we really want to become more environmentally friendly. Over a third of a million pounds is spent on trying to make the company more environmentally friendly.'

How much of a priority is being environmentally friendly to your company?

'We've got to make a product that the customers want to buy, but at the same time it's got to be as environmentally friendly as possible.'

What can you see happening in the future?

'The company is very good at making engines that are more environmentally friendly and it is possible that all cars could become electric. Public demands will push for more environmentally friendly products.'





Lifestyle

From recycling our waste to a greener Christmas, how can we all do our bit?

Eco-occasions

We asked members of the public a few questions about their opinions and knowledge of green funerals. To be honest, most of them had no idea what we were talking about. It's been hard for people to fully grasp what a green funeral is, exactly. For some, it's a wicker coffin and a woodland burial. For others, it's merely the choice not to have flowers at the funeral. While it's clear that people have different ideas for a green funeral, the most important thing is to work towards funerals with lower carbon emissions. This is not as complicated as it seems. There has been a rise in people opting for a greener funeral and there are now many woodland burial sites all over the country. There are also many companies that specialise in greener funerals. Greener Goodbyes, Green Endings and Friends of Nature are a few of the organisations offering professional green funeral services.



Epping Forest Burial Park.

A greener way to say goodbye

Having a traditional burial may seem the formal and loving way of saying goodbye to a dear one. To a lot of the people we talked to, it was the only way they knew of having a funeral. Of course, more environmentally sensible choices can be made for traditional ceremonies. This might also be something unique and a time to remember for you and your guests. For example, a woodland burial offers a peaceful and informal way of saying goodbye to a loved one in natural surroundings. Even for Londoners, woodland burials are possible. A tree can even be planted to mark the grave of the deceased.

We interviewed Julia Rolf from Epping Forest Burial Park. She told us: **'Our site is in an already established mature woodland. We have strict woodland management policies which support biodiversity. We encourage our customers to use biodegradable coffins, and discourage embalming, which releases toxins into the environment.'**

Did you know...?

'A carbon footprint assessment was carried out in conjunction with the University of East Anglia Climate Change Faculty, in order to measure carbon emissions and fuel consumption at the three Woodland Burial Parks during 2009. Epping emitted 9.60 tonnes of carbon dioxide equivalent (CO₂e), which calculates as 21.33 kg CO₂e per £1000 turnover.' This is much less than the 70 kg of CO₂e generated by the average cremation.

What's happening in London?

'London 21 Sustainability Network promotes, supports and networks community-based initiatives for a greener, healthier and more sustainable Greater London.'

London 21 is a fantastic website where people join for free and get great ideas for eco projects across London. Take part in an Eco Local Christmas Party where volunteers are welcome to free food and drinks. For further information visit their website: www.london21.org

Greener weddings: think about climate change on your big day!

Do you ever wonder how much carbon dioxide is emitted in an average British wedding? According to Landcare Research, last year's royal wedding was estimated to have generated 6765 tonnes of carbon dioxide – 12 times the yearly emissions from Buckingham Palace or 1230 times the yearly emissions of an average UK household. These emissions were largely due to international guests. Providing seasonal food and flowers was not enough to turn the royal wedding green!

So, when your day comes, be sure to plan carefully. We asked a local wedding planner about climate change. They said, 'We import our wedding clothes by ship to save money and carbon.' While this is a start, it seemed to us that they need to do much more!

We asked Friends of the Earth and they had lots of helpful suggestions that even Londoners could do. Here are our top three eco-tips for your big day:

- Be artistic and create your own invitations
- Have a honeymoon in Europe – somewhere local
- Have fresh seasonal food

For more ideas, see: www.foe.co.uk/living/articles/green_weddings.html

'Ho ho' eco Christmas

Christmas is the time of year when families come together and get stuck into that juicy turkey, unwrapping those Christmas presents from under the tree. But have you ever stopped to think about the environmental impact of the festive period? I'm pretty sure the first thing that pops into your mind is, 'Oh here we go again, another article on climate change!' Well, yes, you're right, but this article will actually help you to do something about it rather than just giving you a written lecture.

So let's get started with pricey presents and fabulous food. Everyone says it's about giving and not receiving, which is not always the case. Every Christmas 4000 tonnes of presents are shipped from China to London. That's just at Christmas! More than half of

these presents are sent out all over the world, including back to China. All these presents are nicely wrapped in wonderful Christmas wrapping paper, designed with fancy trees, Rudolph and Santa Claus, but which all too often end up going straight to landfill instead of recycling. In many cases people get presents they don't even like – a waste of money, materials and time.

More than 10 million turkeys are eaten each year on Christmas day, and they're not all farmed in the UK. Another staggering fact is that more than 7 million Christmas trees are grown and sold every year in the UK and most of them end up AS LANDFILL! Think about all those poor Christmas trees and all that energy that has been wasted. Sad isn't it? What a way to have Christmas.



This is a Christmas decoration which has been made with plastic and is mostly likely to be put in the bin after Christmas.



This picture was taken in Covent Garden during the Christmas season last year. How much energy is being used?

Top ten tips for having an eco Christmas

Tip 1: Send recycled, handmade or e-cards. An estimated 1.7 billion Christmas cards are sent each year in Britain. That's the equivalent of 200,000 trees. More than 1 million cards are thrown out.

Tip 2: Use recycled wrapping paper. More than 83 square kilometres of wrapping paper is thrown into the bin.

That's enough paper to wrap the island of Guernsey.

Tip 3: Don't buy paraffin candles. Paraffin candles are no good for your health or the environment. Use soy, beeswax or natural vegetable-based candles.

Tip 4: Use real holly. Instead of wasting your money on artificial holly which

doesn't decompose, buy natural holly and let the smell fill your house.

Tip 5: Even though fake Christmas trees look nice with their metallic colours, they use a lot of energy to be made, and contain PVC, lead, etc., which are serious environmental pollutants.

Tip 6: Batteries contain toxic

chemicals, don't decompose and often can't be recycled. Use rechargeable ones, which will last for a long time.

Tip 7: Recycle unwanted presents. Recycle unwanted gifts to charity and DON'T throw them away.

Tip 8: Buy eco-friendly gifts or join a sponsorship for Christmas.

Tip 9: Use energy-saving lights, especially LEDs. Less energy will be used but it will still look great.

Tip 10: Use real cutlery. Plastic cutlery and plates use a lot of energy when they are made. Use real plates, cutlery, etc.

Recycling – your future needs you!



The past

Climate change is a serious issue for everyone and has become increasingly serious over the past 50 years. This is due to a greater demand for fossil fuels in the production of electricity and fuels for transport, and land clearance for farming. All of this has led to an increase in the amount of carbon dioxide in the atmosphere.

There are some things we can do to help prevent further climate change, such as recycling and reducing the amount of rubbish sent to landfill sites and to incineration. In order for everyone to take responsibility for their contribution to climate change, they need to know the facts. What can you do to reduce your impact on the climate? Do you recycle? What legacy will be left for future generations? This article discusses how the past can be corrected by recycling in the present, for the future of the planet.

The present

Harrytown is committed to recycling, with recycling bins in all classrooms. We send the majority of waste to be recycled. We interviewed Bob Thomson, Site Manager of the Junction 25 recycling centre in Bredbury, Manchester. He said, 'It is not sensible to use up non-renewable resources.' He informed us that of the 3000 tonnes entering the site each week, 99% is recycled. Residuals (non-recyclables) which had to be sent to landfill originally were now being used in Denmark as a fuel to give local residents heat and electricity, reducing the amount of fossil fuels required. Recycling has increased massively, however we asked Mr Thomson how he would encourage young people to recycle. He replied, 'Recycling is important to the environment, and as you get older you have to protect the environment we live in. It's not down to the authorities, it's up to the individual!'

Our school recycles the majority of its waste. The pie chart (Figure 1) shows the most recent breakdown of the waste recycled. Of the 63% of general waste, 6.5% was paper, 1.5% was plastic and only 3.1% was non-recyclable. We

endeavour to continue to recycle and make every effort to be responsible for our usage of valuable resources.

Wildlife and its habitats are being affected by climate change. We interviewed Richard Gardner, Living Landscape Project Manager for the Cheshire Wildlife Trust, to find out how local wildlife is being affected. Richard works in a landscape project in west Cheshire, studying wildlife along the River Gowy as well as the nature reserve at Gowy Meadows. Organisms he studies include barn owls, water voles, lapwings and skylarks, as well as various aquatic invertebrates. His work restores wetland habitats for wildlife, in particular focusing on increasing the number of farmland birds nesting in the area. Farmers have dried out areas of field next to the river, enabling agricultural practices which limit bird nesting. Mr Gardner informed us that recreating wetland habitats not only helps the organisms, it also helps to 'lock up' carbon from the atmosphere in the moist flood-plain soils, reed beds and wet woodlands, reducing carbon dioxide levels in the atmosphere.

Waste disposal at Harrytown Catholic High School

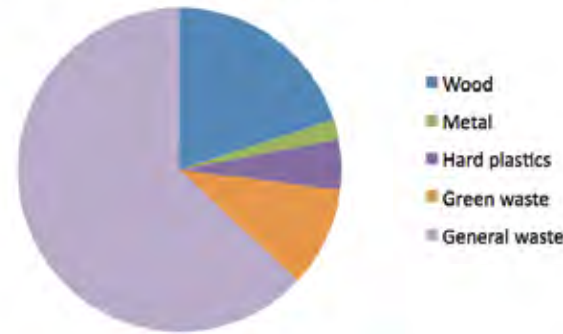


Figure 1

The future

It is important to remember that whilst strategies are being put in place to reduce the rate of climate change, it is the next generation who need to be informed and equipped to continue to make the change.

We asked 104 Year 7 pupils six questions regarding recycling and climate change. We found out that a staggering 95% of pupils do recycle at home. However, only just over half who gave answers know what climate change is (8 out of 104 people didn't answer that question). If they aren't informed about climate change we need to ask, can they make a difference in the future? When asked 'How much do you

think climate change will affect you in the future?' only 43% selected the option 'A lot' (Figure 2). Although these results seem to show that some Year 7 pupils are unaware of the extent of the problem, we did find that 70% feel strongly that not enough is being done to prevent climate change. In addition, 69% (22% did not answer) thought that wildlife is being affected by climate change.

So, now you have the facts you can make an informed decision as to how you can make a difference for the future. The past has been and gone. It is what we do now, in the present, that will dictate the future.

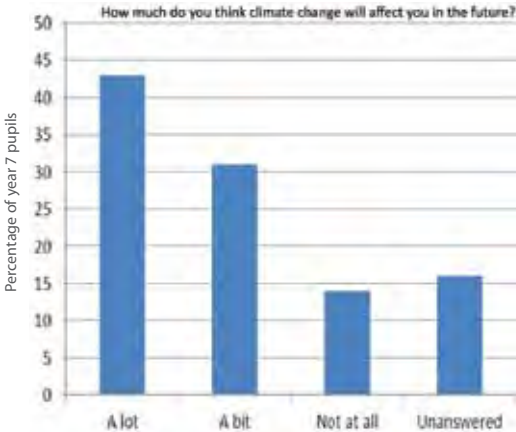


Figure 2

Life swap

Join us as we follow two children in their struggle to save the Earth from disaster. Do you want your children's children, etc. to suffer this fate?

In this social and scientific experiment we take two

13-year-old children and see how they treat the Earth. Ed, an 'eco head', and Sadie, a 'wasting lady', visit each other and see how the other lives. Can these two different teens learn from each other?



Status:

Playing on my laptop while havin' a chat on ma moby :-P

Facts about me:

Hey, I'm Sadie. Um... well... I live in a mansion and I love to play on my laptop and PS3, DS, mobile, etc. I also like randomly driving in cars. We do this all the time, even to the corner shop. We spend quite a lot on petrol bills, but hey, who's counting? There's no point in walking when you have a car. I love holidays, we have three a year. Big ones, and we fly there too! I get new clothes all the time, I love it! Buying clothes from really big brands to look epic, it's fun!



Sadie, age 12

Sadie's diary

Dear Diary,

12.00

When Edward came round to my mansion, he was appalled by how much electricity I use. Just yesterday I thought I was a normal person, but now I see that leaving things on stand-by and the tap running is not a good idea.

13.30

Ed invited me to his house to see how he saves energy. He saves so much! I didn't know it was possible to live like that. He has a compost heap that he puts his waste on, and then uses the soil to grow vegetables such as peas, tomatoes and potatoes. I mostly agree with Ed saving energy, however I find his favourite phrase a bit... odd! He says, 'If it's yellow let it mellow, if it's brown flush it down.' I think it's a bit gross, but after my realisation of how much energy I have wasted over the years, I really need to get stuck in and start to do the best I can to save energy and to protect the environment. Just the other day I was doing my homework and I wasted hundreds of sheets of paper from all the mistakes I made. I learnt that I could do my homework on the computer and check my work before printing to save paper. But I also have to be sure I don't use the computer for too long as it wastes electricity.

14.30

To be honest, I should have figured this out earlier. I was humiliated when Ed pointed out how in only an hour I had wasted at least a tree! I'm ashamed with myself... I'd go to the posh supermarket miles away because the ones that are near me don't sell the brand of cereal I like. This wastes lots of petrol and money. I need to learn not to be such a fussy eater. I am determined to change!

15.45

It will be hard to change because I have lived my whole life this way; I have kind of got into the habit of leaving the taps running and washing my clothes one at a time in the washing machine. Nevertheless, I really want to save the world. Apparently, my grandchildren could have no coal or oil; they will have to lead their lives so differently.

17.00

The world really needs to save energy, and I am going to be one of the people who help save it! I really hope that other people can see our future will dissolve as quickly as sugar in water if we continue this way. I am now going to set up a compost bin and inform my new friend, Ed!

Sadie x



Ed's diary

Dear Diary,

12.00

Today I went to Sadie's mansion. She may be rich, but she certainly wastes too much of her family's money on electricity bills. She leaves her taps running, leaves her windows open, and she doesn't even have a compost heap! I'm sure I can make her a lot more energy efficient.

12.15

We were in Sadie's room, and she had left all her appliances switched on, which was wasting a lot of energy. We started off with a pizza, which was in a cardboard box, and a coke bottle made out of plastic. When we had finished, Sadie didn't recycle the cardboard; instead, she just threw it away. She also didn't bother recycling the plastic and threw it in the bin too. She then spent ages washing up the cups, which would normally only take a few seconds, whilst leaving the tap on full blast, wasting lots of hot water. She then needed to wash the cloth used for washing up, so she put a whole bottle of detergent in, just for one wash, and then dried it on its own in the tumble dryer afterwards, when she could have dried it outside on the washing line.

12.30

Later when we were watching TV, Sadie's mum called her because she had just received the energy bill and it was a huge amount of money: £400 for just a month of electricity! So we had to walk to my house so I could show her the best way of living. She couldn't believe it when I told her that I switch everything off when I'm not using it, or close all my windows instead of turning up the heating with the windows open!

Ed

ARCHBISHOP HOLGATE'S SCHOOL, YORK

Ed, age 13



Facts about me:

Hey, it's Edward here! I think that the first thing I should say about me is that I am the most eco-friendly person you will ever meet! Preserving and saving energy is my mission in life. I plan to save as much energy as I possibly can. I plan to do this in many ways. For example, I make my own compost to fertilise the garden and grow vegetables, so I don't have to travel to the supermarket to buy them. Instead of using fossil fuels, my house is powered by solar energy. I really enjoy the fact that I am saving the Earth for the next generation. I can't explain the feeling you get when you know that the Earth is benefiting from your way of life.



Quiz

1. Do you recycle?
a) Yes b) No

2. Do you have solar panels on your roof?
a) Yes b) No

3. Do you own a compost bin?
a) Yes b) No

4. Do you drive places within half a mile of your starting point?
a) No b) Yes

5. Do you leave the water running when you wash up?
a) No b) Yes

Mostly A

Well done! Keep it up and save our planet.

Mostly B

Hmm, maybe you should rethink your lifestyle!

RING RING, recycle bin!

Mobile phones are so important to our everyday life. In fact 61% of the Earth's population has a mobile phone, but most people keep their phone for less than a year! This means that 140,000 phones end up in landfill and 65,000 tonnes of mobile phone waste is discarded each year. That's equivalent to six and a half Eiffel Towers!

We saw these issues and decided to create an article based on e-waste which would demonstrate what a huge problem it is becoming. We want to educate people about the problems caused by chucking your phone in the bin, what you can do to help and why it is so important!

How many old mobile phones and electrical items do you have sitting around in a drawer at home?
What a waste of valuable resources!

Our trip to the materials recovery facility

To find out more about recycling we travelled to the materials recovery facility (MRF) in Wandsworth to see what they do with all our rubbish and recycling. When we arrived we were greeted by the manager, Steve, who guided us throughout this 'trashy' journey.

On our journey we saw how the rubbish trucks bring the waste in, then how it gets sorted into different material, bundled up into big bales, and finally put into the huge barges that ship the recycling off up the Thames to be made into new products. During the day we managed to get a quote from Steve about his opinions on recycling:

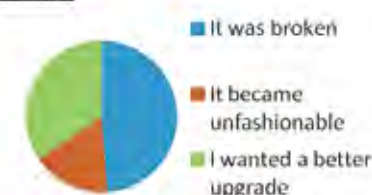
'It is very important that the younger generation encourage the older generation and educate them to be more aware of the environment which affects them.' This made us realise that recycling is a very new process for some members of our society and that it only happens in a few parts of the world. However if we don't recycle and just throw our waste into landfill, it is like burying money! After seeing the MRF and hearing Steve's ideas, we decided we had to make people aware of how much money and resources they waste by just throwing their old phones away!



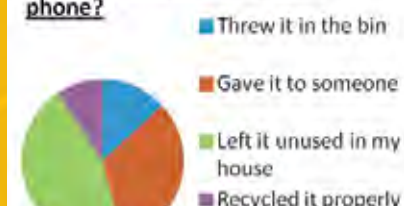
What our students said about their mobile phones

After a fascinating workshop on e-waste from the charity Waste Watch we decided it was time to investigate, so we interviewed all of the sixth-form students at our school and asked them three questions about their phone usage. The results were quite shocking. Although the majority of students got a new phone because the old one had broken, only a tiny percentage of students recycled their phone properly, and some even chucked their phones in the bin!

Why did you get rid of your last phone?



How did you dispose of your phone?



How many phones have you had in your life?



Our top tips to help you recycle at home!

It is so easy to stick with what you know rather than break bad habits and start being more environmentally aware. We don't just want you to start making a change for yourself, but to help your family and friends to do the same as well. Promise yourself never to chuck out any more e-waste!

Here are some top tips we recommend to improve the way you deal with old electronics or mobile phones...

- **REDUCE** the amount of upgrades on your phone until you really need one.

- **REUSE** your phone by selling it on websites or you can give it away to younger siblings or charities.
- **RECYCLE** your phone at your local tip if it does not work at all. Never ever throw it in landfill!
- Make sure that any phone you purchase has recycled material.

These tips will hopefully help you to save your environment. Remember a 'dead' mobile phone is actually jam-packed full of valuable resources and materials that can be used over and over again!

Talking action with our head teacher!

After seeing the results of our sixth-form survey and talking to Steve at the MRF, we decided it was time to take action at school. We took our ideas to Sir William Atkinson, our head teacher, as he has the authority to change the way we work here in Phoenix High School. We began by introducing our demands, which were to raise the budget given to us for recycling and have some opportunities to educate our peers about e-waste and recycling in school. Sir William was really excited to hear about our project and said:

'A young group of citizens participating in such a massive resolution of environmentalism shows their dedication and care towards the planet.'

We discussed the need to:

- Reduce the number of mobiles bought in a lifetime
- Find a way to reuse mobiles

He told us that he reuses electronics by selling them online at www.mazoomamobile.com and works with his staff to recycle his electronics properly. We will be setting up a mobile phone recycling bin in the school office and putting posters around school to inform our students about our cause.

Sir William believes:

'This project and the "Green Crew" will have a big impact in tomorrow's world, and it is vitally important that young students such as these are at the forefront of educating other students on how to help.'

Words of wisdom

In conclusion, this project has shown us how wasteful people of the UK and more locally our own students are, and why Britain is called 'the dustbin of Europe'. We think it is vitally important to put that right, by starting to make changes ourselves, and then educating others to do the same. We promise to make our school community a more environmentally aware place and to pass on the message to everyone we meet. Will you do the same too?

Count your footprints, count your miles

ST BERNADETTE CATHOLIC SECONDARY SCHOOL, BRISTOL



Going green

St Bernadette Catholic Secondary School has been busy these past few months! We're building our own greenhouse to grow our own fruit and vegetables. From recycling bottles to insulate it, to converting the existing building and fundraising, this project is an opportunity for the whole school to reduce its carbon footprint. There are so many ways that the greenhouse will benefit our school.

Check your wrapper, check your sole

In our science and geography lessons we have been studying climate change and the impact it has on our planet. We used a carbon footprint calculator and were shocked to find that most of us use more carbon than our planet can sustain. As a class we wanted to reduce our impact and so looked at ways we could do this, such as reducing energy use, recycling and buying local produce. Our teachers were already thinking about converting an existing building into a greenhouse and thought this would be an ideal project for our climate article. We decided to focus on the food miles aspect of the project as we found out that 95% of our fruit comes from other countries and half of the vegetables we eat are imported. There has been a lot of media attention focused towards reducing flights, as aeroplanes produce a lot of carbon. However, we were unaware that our food has also flown hundreds of miles to reach our plates.



Going green

The greenhouse project has been gathering momentum since January 2011, with teachers from each subject contributing to it. For example, food technology will use the fruit and vegetables grown for lessons, business studies would like to test business models, RE have reserved space for 'new life' and our local primary school is also involved. We have been raising awareness of the project around school by visiting assemblies, recycling bottles and holding fundraising events. We hope that in about four years' time our greenhouse will be able to support the school and local residents of Whitchurch. We hope that our school will be able to reduce the miles we use for our food, because it will be grown locally in our greenhouse. In addition, we would like to get an engineer involved to install a solar panel, which will reduce our footprint even more. Current and future students at St Bernadette will learn to do their bit to protect the planet we live on.

What the expert says

We contacted Dr Wendy Woodland, an environmental scientist from the University of the West of England. We asked her if she thought small-scale projects such as our greenhouse could have an impact on combating climate change. She said: 'Yes, I think it will help because it raises awareness of climate change amongst the next generation of people who are going to interact – and shape – the planet. If we all take small steps then, collectively, we CAN make a difference! We can reduce our energy use, reduce our greenhouse gas emissions and help towards reducing the amount of warming that the planet will experience in the future.'

Watch this space...

It isn't easy being green...

You've had the salesperson on your doorstep, answered the phone calls and read the flyer. So, what are 'solar panels', why are they so popular and should you have them too? Marlwood's Year 9 climate scientists investigate...

Photovoltaic (PV) panels are made up of several solar cells, which are made of silicon. They are then wired together inside the panels, and when exposed to light they produce electricity.

But how can they produce 'pollution free' energy when their manufacture causes pollution and uses up resources? Well, on average they provide 26–29 years of pollution-free energy and greenhouse-gas-free electrical generation.

So the reasons for installing PV panels could be that they reduce your personal greenhouse gas emissions, allow you to be more independent from the electrical grid – and maybe even make you money. However, some government grants which offset the costs of installing PV panels stopped on 3 February 2010. These grants were replaced by feed-in tariffs (FITs), also known as a clean energy cash-back scheme. The average payback time for PV panels generally depends on where you live, the aspect of the roof on which they are installed, and the household's energy consumption.

Is planning permission needed to install them? Not always, but it's a good idea to get advice from the companies themselves. The actual installing of the panels is easy, but the main problem is damage caused to your roof when drilling holes to attach bolt-on systems.

As John Vidal reported in the *Guardian* newspaper, there are other pitfalls in saying 'yes' to solar panels. For example, some companies lease homeowners' roofs for 20 years, installing their panels and reaping many of the rewards. Homeowners then find it hard, for example, to break this contract if they need to change their home or even sell it. Some companies use hard-sell cold-calling techniques, may overcharge, ask for upfront deposits or offer minimal 'cooling off' periods.

So, if you do decide to 'go green' what should you do?

- Look for companies accredited under the Microgeneration Certification Scheme and that are members of the REAL Assurance Scheme.
- Check the Energy Saving Trust website for information and target prices.
- Read carefully before you sign a contract or pay a deposit.
- Get several quotes, and try to find objective reviews about the companies. Once you have settled on an installer, ask for a written quote and an estimate of how well the panels will perform on your property.

Mrs Hipkiss, science teacher

There are many reasons for installing PV panels and one of them was to enhance the science curriculum; as Marlwood School is a science college, we thought that to have something innovative, different and environmentally friendly would be a good idea.



Mrs Hipkiss and a picture of the solar panels, installed as part of her 'Green Lab' project.

Mel Jeffries, science college development officer

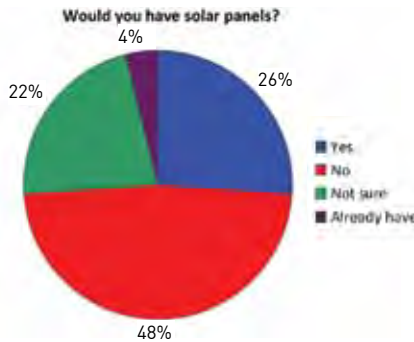
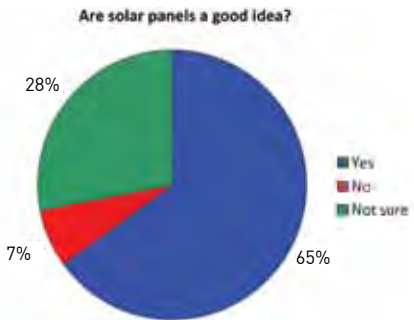
Marlwood had PV panels installed in February 2011 as a significant resource for the 'Green Lab' development at the school, providing both a learning tool and a saving on energy costs. There were grants available to pay for the panels: the Low Carbon Buildings Programme paid 50%, Thornbury Grammar School Trust paid 20% and the Specialist Schools and Academies Trust paid 30%. The total cost came to £15,000. It took a long time to gain permission from the council to install the panels, and then we came across a few problems such as issues with some of the cabling and positioning the panels on a flat roof. After they were installed, whining noises from the inverter fitted in the science laboratory caused a severe distraction to students' learning. These problems have been rectified, and so far the panels have fed £252.44 worth of electricity back into the grid this year.

Ms Hawke, ITT student and ex-employee of DEFRA

There is a wide variety of reasons to install PV panels; for example they use a renewable source of 'free' energy and can lower your carbon footprint. I think they make a good contribution to the school's 'low carbon community' project.

We have conducted a survey with a sample of 70 Year 9 students and their parents at Marlwood Secondary School, to see what they think about PV panels. Fewer than 5% of those interviewed could not correctly identify the purpose of solar panels. Most of the students' parents had been informed of

their purchase and installation; many thought that a reason for having them installed would be to save money in the long run, although the majority felt that the initial financial outlay was too expensive. Around 40% thought that 'going green' was an important reason for having PV panels installed on their roofs.





Environment

We look at the impacts of climate change on wildlife, farming and the natural world.

Climate change: the view from the Castle

Our school is situated near the Severn Estuary and is really close to three nuclear power plants and also near sites important for wetland birds. We have looked into how climate change has affected us and provide you with the view from our school.

Our nuclear neighbour

Oldbury Power Station is a nuclear power station near our school and was opened in 1967. In May 2007, a few days after it was reopened, the power station had to be shut down because a fire broke out. It was said to have been caused by an insulator which overheated, though fortunately no radiation was released – phew! But this did highlight the potential danger of nuclear power plants to local inhabitants. This level of danger is one of the reasons why some countries are reconsidering the construction of new power stations.

Some people think that Oldbury Power Station is damaging the local habitats and wildlife, but in some ways it is actually helping it! In

this article we will weigh up the pros and cons of nuclear power as an alternative energy source.

First, let us look at the negative effects of the power station on the wildlife around the pristine countryside of Oldbury. Oldbury Power Station is visible from our school and is immensely large. It has taken up lots of space which otherwise could have been a forest or some other habitat that could have housed a wide variety of wildlife. Some local residents are also not best pleased that the power station intrudes on their view and feel that it is not suited to the peaceful and calm countryside.

Now let's take a look at the positives of Oldbury Power Station. To start, when it was built, silt lagoons were

constructed also. These were used as a constant cold water supply to cool the massive generators. These are a haven for wildlife, especially wetland bird species. The power station also is an alternative to the burning of fossil fuels to produce electricity. Nuclear power causes much less carbon dioxide (CO₂) to be released, which reduces our contribution to climate change.

However, after 44 years of generating electricity for people's homes, the last reactor of Oldbury Power Station was shut down on the 29 February 2012. The power station was shut down as it lacked efficiency and needed modernising. Since being turned on in 1967, it has created enough energy to power 1 million homes

for 20 years! It is also now a destination for walkers who want to enjoy the scenic views of the River Severn along the specially designed nature trail, leaving a really positive legacy.

The remaining fuel contained in the reactor will be separated and any harmful and dangerous parts shall be decommissioned over the next three years. However, the building itself will not be demolished until 2100, when the radiation levels are low and safe. By 2025 commissioners hope to construct a new and more efficient power station next to the old power plant, in order to keep producing electricity for our heavily populated areas.

Will Slimbridge survive?

The future of Slimbridge hangs in the balance. Slimbridge is a place of serene natural beauty. It is on the banks of the River Severn, and a Site of Special Scientific Interest. Thirty-five thousand birds call it home and it covers over 325 hectares. Climate change could soon deprive us of this tranquil and peaceful place.

Wetland habitats are disappearing fast due to the horrifying effects of climate change. Because wetlands

need rain and water they are particularly affected by climate change. There may be less rain in the future, causing them to dry out. Also, an increased temperature may dry them out even further. As many species that live there depend on water, many will be forced to move, which will not be easy for smaller creatures such as the water voles, newts and many more. Even the birds, which can cover huge distances, won't necessarily be able to cope with the changes. Coupled with the fact that

alien species from other environments may invade, we may see a decreasing number of native species, and some may even go extinct!

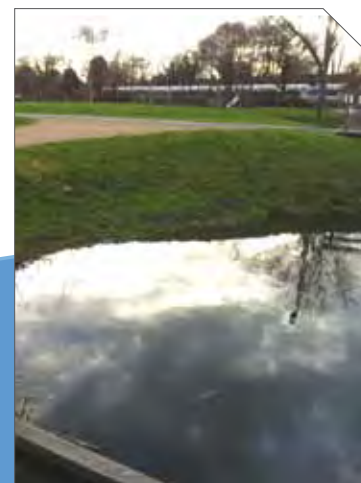
Disappearing wetlands will increase the rate of climate change, as wetlands and peatlands contain 500 gigatons of CO₂, twice as much as the world's forests combined. One resident living in the Castle School area said, 'It would be very sad if the wetlands are destroyed. Conservation work is vital and it would be sad to lose the wetlands.'

But there is hope. The wetlands may yet be saved for future generations to enjoy. Even small things help to preserve them. For example, just turning down the temperature on your heating or cycling to places that are a short distance away will help. If everyone does this, the savings in CO₂ will be massive. But is this all too little, too late?

Climate change in our community

Climate change is a growing problem disturbing our natural order. The poles are melting, and many animals are becoming endangered, such as polar bears. The oceans' levels are rising; New York and Japan are sinking. In this article we will be explaining the effects of climate change in our local community and what this means for our local river.

The River Ravensbourne is the heart of Lewisham in southeast London. The Ravensbourne and other local rivers give a distinctive and attractive focal point that brings together not only wildlife but also the local community, giving a green space in a big, heavily populated commercial area. This comes with its own challenges. Local people are worried about litter and the pollution of their river and local environment, but what about the impact due to climate change?



Local community views

Seventy local people answered our questionnaire on their local area and climate change. We found:

- People did not know much about climate change
- People felt they could not make much difference as it is too big a problem
- Some thought global warming was a good thing – hotter summers
- People were more worried about litter and dirt in the area

River Ravensbourne, part of the big picture

In the last hundred years or more we have witnessed the river's gradual alteration from an open, green river corridor, rich in habitat, to a heavily constrained artificial channel, hidden away. This has long constrained the potential of the river and has a strong impact on our ability to reduce flood risk and mitigate the potential impacts of climate change, the wildlife the river can support, as well as the opportunity to use and enjoy the river. The London Rivers Action Plan is a response to the problem of concreted-over rivers.

The report on the River Ravensbourne says: 'Because the prediction of climate change impacts will never be exact, flexibility and adaptability of the river environment is fundamental to flood

management. Bringing back space for water and vegetation is now considered as the best approach to bring back flexibility when managing flood risk but also when trying to re-establish river habitats as well as cutting down on the soaring temperatures, increasing pollution levels and the need for even more air conditioning.' (Ravensbourne River Corridor Improvement Plan, www.lewisham.gov.uk)

The river has been redirected from the old concrete culverts and given space to flood naturally in the open spaces around the river. This has improved the whole area and as well as helping with flood management, it gives a green space for wildlife to use and for people to enjoy.

Why should we bother?

When we asked our local community what they knew about climate change, most people replied 'not much', or they thought it was too big a problem to solve. One woman said Britain was too small a country to make a difference if the rest of the world did nothing. The river shows that good things can be done and that it makes a difference if we work on solutions to our problems.



Are Torbay's beaches going to be washed away?

Are the beaches and coastal habitat that made Torbay the popular tourist destination it is at threat from the seas?

There is growing concern that Torbay's beautiful beaches will disappear as a result of climate change. Redgate Beach is already closed and both Oddicombe Beach and Anstey's Cove have been subject to closure due to rock falls from crumbling cliffs. Ilsham Marine Drive, one of the many coastal roads in the bay, has already started slipping into the sea and has been reduced to a single-track road as a result.

Local people are very concerned about the potential loss of the beaches. Amie said, 'The beaches are what people come to Torbay for,' and Abi said, 'The council need to keep them open.' With many of Torbay's school students having seasonal jobs in the tourism industry there is concern that students will not be able to find employment if visitor numbers decrease.

Whilst the general public is increasingly aware of the potential impacts to the UK of sea level rising, there is little publicity for the potential effects of increased storms and coastal erosion and on the complex marine habitats beneath the waves. Kara is very concerned about the marine corals and sea horses that live in the waters off Torbay; she said, 'We need to protect this valuable habitat for the future.'

- Torbay is unique in its position in the southwest of England and has 22 miles of coastline with over 20 beaches and coves.
- It has the highest number of Blue Flag beaches in the country.
- In 2007 visitor spend was worth over £438 million (South West Tourism) to the Torbay economy.
- The total value of tourism in Devon is £2.3 billion (Devon County Council).
- In Torbay 21% of the population are directly employed in tourism.
- In 2007, Torbay became the 32nd European Geopark because of its unique geological features and coastline.



FACT

Climate change and the waves

Waves are made by the wind. When the wind blows on the water it creates little ripples. The stronger and longer the wind blows, the more effect it has and the larger the waves become. Coastal erosion occurs when destructive waves wear down the cliffs by hydraulic action, attrition or abrasion. Climate change is predicted to increase both the frequency and severity of winter storms coming in from the Atlantic because the North Atlantic oscillation is predicted to become more positive. This could speed up the rate at which the cliffs are eroded onto the beaches or wash the beaches away.

'If the bees disappeared off the surface of the globe then man would have only four years of life.'

Albert Einstein

Bee

thoughtful

We don't survive on our own. Other animals and plants are important factors in our survival, and on 27 January 2012 students from Charles Edward Brook School took notice of this. What did they do? The students – with the help of their teacher, Mr Johnson – raised money for the charity Bee Thoughtful to raise awareness about bees. The money raised will go towards buying a beehive and adopting some bees in order to help increase the declining bee population in England. The question is, what is causing the bee population to decrease in cities and the countryside, and is climate change to blame for this? We are going to investigate.

As part of their GCSEs, Year 11 students had to choose a project about the environment and they chose to investigate the importance of bees to us and the environment. They held a charity event where students could wear anything that was yellow, brown and black – all colours of bees – instead of uniform, but they had to pay a pound. During lunch and break, biscuits, cakes and jewellery were sold that the older students had made. The students raised over £400, which is going towards adopting beehives in London.

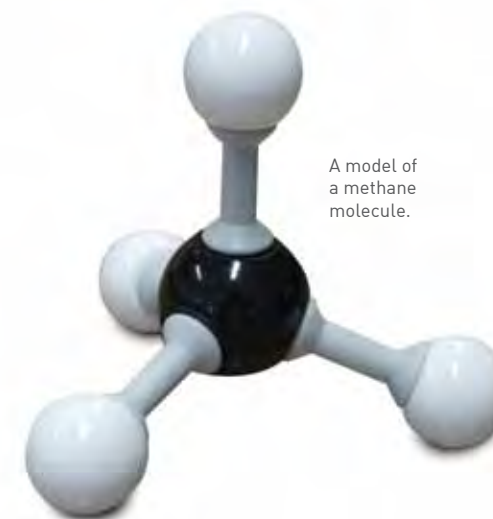
The bee population is in decline in cities such as London and also in the countryside. Once Albert Einstein said, 'If the bees disappeared off the surface of the globe then man would have only four years of life.' The decrease in bee population is because of the ever-increasing use of pesticide on crops by farmers. The pesticides poison the bees, as Mr Johnson explained, and some even become very

lazy and fail to pollinate. Over 80% of pollination is carried out by the humble bees, but because of the growing size of cities and demand for high-quality crops, farmers are forced to use pesticides which prevent bees from pollinating.

In addition the climate in the UK is changing. We are experiencing much milder autumns and winters compared to ten years ago. As the Earth's climate gets warmer spring starts earlier, which means that bees are emerging earlier than their usual time. As bees are vital for pollination of flowers, any change to this balance could have devastating consequences. If plants do not flower at the correct time, no pollination means no crops for humans.

So give a thought for the bees that we rely on for so much, from food to floor polish to cosmetics. Adopt a beehive and help increase their dwindling population.

Can COWS cause climate change?



Cows produce methane (a greenhouse gas) by burping and farting. The question we are going to be looking at is whether it is enough burping and farting to affect global warming. Also, are people prepared to eat less beef and drink less milk to help reduce global warming?



Agriculture is estimated to produce 14% of the world's greenhouse gases; whilst we are ploughing ahead with our farming we have a big problem ahead of us. Something that contributes to global warming 23 times more than carbon dioxide (CO₂) is the greenhouse gas methane, which agriculture produces at a rapid rate. Due to the world's 1.5 billion cows and other similar animals there is plenty of methane being produced on a daily basis.

Methane is a tasteless, colourless and odourless gas; it is commonly used as gas in stoves and is also burned for heating. It is the simplest of the hydrocarbons and consists of one carbon atom and four hydrogen atoms.

Cows, goats, sheep and several other animals belong to a class of animals called ruminants. Ruminants have four stomachs to digest their food in instead of in intestines as humans do; ruminants eat food, regurgitate it as cud and then digest it again. Their stomachs are filled with bacteria that aid in digestion, but also produce methane.

All animals create methane; however cows are the worst of them. They create an equivalent to 34.6 kilograms of CO₂ for every kilogram of beef, almost twice the amount of the nearest type of meat, lamb. In comparison pork produces 5.5 times less CO₂ equivalent for every kilo.

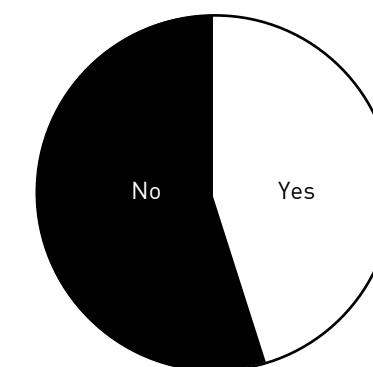
Statistics vary regarding how much methane the average dairy cow expels. Some experts say 100 litres to 200 litres a day (for about 26 to about 53 gallons), while others say it's up to 500 litres (about 132 gallons) a day. This amount can even be compared to the average monthly use of petrol for an average car.

Cows contribute a total of 3% of Britain's overall greenhouse gas emissions and 25 to 30% of its methane. A three-year study by Welsh scientists that began in April 2007 is examining whether adding garlic to cow feed can reduce their methane production. The study is ongoing, but a reliable source says that early results indicate that garlic cuts cow flatulence in half by attacking methane-producing microbes living in cows' stomachs. The researchers are also looking to see if the addition of garlic affects the quality of the meat or milk produced.

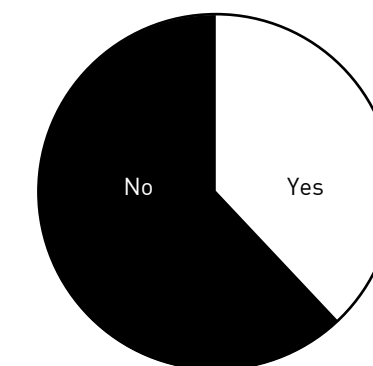
One idea suggested to cut methane output was to ration beef and milk. We took a survey of 53 people to see whether they would be willing to consume less beef and milk to help reduce global warming. Here are our results:

These pie charts show that there are fewer people willing to consume less beef and milk to reduce global warming than people who would not be willing. One person said, 'I believe there are much better ways that we can help to reduce global warming than consuming less beef and milk.'

Would you eat less beef if you knew it helped reduce global warming?



Would you drink less milk if you knew it helped reduce global warming?



So it appears that these innocent-seeming cows are guilty of climate change. It also seems people aren't willing to give up dairy products and beef in order to help cut down on climate change. So maybe it is time we had a look at the research into using garlic as a food additive, or shall we change our lifestyle to stay intact with our world?

The bees are buzzing off!

What's the buzz?

Global warming is starting to affect British bees in all kinds of different ways.

Our recent weather has generally been more extreme over the past few years. The nature of our seasons is starting to change. Spring is generally hotter, especially April, which has been around 3–4 degrees hotter than average, meaning the bees are flying and swarming earlier than previously. According to some beekeepers they haven't flown or swarmed this early for over 50 years. This affects what pollen is available at different times of the year. In 2012 we had an extremely mild winter and some spring plants

came out early, before the bees were flying, so the bees missed out on some of the spring pollen.

In the ever more frequent and concentrated one- to two-week hot spells we are having some bees can't cope with the heat and are having to come out of their hives to cool down. They fan their wings in an attempt to keep the hive and larvae cool. In some hot spells their wax starts to melt and they lose their larvae (developing bee eggs).

One of the other main problems with global warming and bees is pests. The current pest with bees is varroa, which is being helped by

global warming. It breeds better in warmer temperatures and breeds more productively all year round. But that's not the main problem. Heading for Britain is a much more serious problem, the Asian hornet. They were accidentally imported into southern France and are fast moving north, thriving at higher temperatures due to global warming. They hang around the hives in groups of around 50 and kill individual bees one by one so the bees stop flying. And because they stop flying they are no longer bringing back food. Once the bees have used up all their food supplies they grow weak. The hornets then invade and destroy the hive.



Bees in heat of 30–40 °C in the summer of 2010, Wirral.

Tweeting the changes

We visited Burton Mere Wetlands, a local RSPB bird sanctuary, to find out if climate change is affecting wildlife in the Dee Estuary. Burton Mere provides feeding, nesting habitats and roosting sanctuaries for overwintering wildlife, including passage waders (birds passing through the sanctuary during their migration).

We interviewed Paul Brady, the RSPB Ranger at Burton Mere...

Do you notice any unusual changes with bird migration?

'Yes, some of the birds (such as swallows) have been staying for quite a bit longer. We think this is because of the rising winter temperatures, which the birds find more suitable.'

What interesting types of birds can you find in the mere?

'Seventy per cent of the birds are migratory, so we get different birds all year round. There are fascinating woodpeckers found at this mere.'

Has there been any increase/decrease in the bird population in the mere?

'Yes, since Burton Mere was bought by the RSPB many birds like little egrets have steadily increased since the 1980s. Before the 1980s they were an endangered species, but now they are thriving.'

Has there been any improvement of the mere since the RSPB bought it in 2008?

'Yes, they have renovated some of the farmland, added facilities for visitors and created a unique wetland habitat.'

Do you think the condition of the environment is affecting the birds?

'Across the Dee Estuary there is a fossil-fuel power station, and also a paper mill. However, these do not affect the birds at all because the companies monitor and control their emissions.'

How is climate change affecting Burton Mere?

- Flowers such as snowdrops are blooming earlier in the spring and oaks are in leaf earlier.
- Migrating birds may have to change their migration routes and places where they breed or spend winter.
- Wetland birds such as redshank will find their habitats threatened by climate change: salt marshes will become inundated by the sea, while moors and wet grasslands will dry up during hot summers.



Bye bye, Spuddy

Global warming

Earth's climate is changing worldwide! This consists of increasing temperatures and a rise in sea levels. Much of this is to do with human activity. Scientists estimate that the Earth could continue to warm over the next 100 years. If all the countries would come together and unite we could reduce global warming. Normally oceans and plants would absorb the carbon dioxide that we produce, but we are producing too much for them to absorb. This can cause glaciers to melt, causing flooding. Our actions on this planet are increasing global warming massively.

Impact of climate change in North Somerset

They did a Local Climate Impact Profile in July 2010 and key findings were excessive rainfall, flooding, snow and ice events. Consequences include school closures, disruption to public transport and waste collection, and tourist events cancelled, including Weston-super-Mare football matches. This extreme weather has the potential to increase as the climate changes, so a system should be improved for safety measures.

One pensioner complained about global warming affecting his crops

Last year Mr Smith suffered a huge loss in crops due to lack of rain and too much sun. Mr Smith, who is 86 and has been growing crops in his allotment for 47 years, fears for the future because of climate change.

The effects climate change has had on Mr Smith's allotment could be disastrous. Because of climate change the seasons have differed. Winter has been warmer, which is good for growing, though only to a limit. But the real problem for Mr Smith is the lack of rain in the summer. Not only does the lack of rain ruin many crops, but it also means more work is needed on Mr Smith's part. Even with the crops being watered manually, there is a high chance he will still lose a lot of his crops because his vegetables will not get the natural nutrients needed from rainwater.

When asked on his views about climate change, Mr Smith said that for the moment he believes it affects him mildly but is concerned for the future of his allotment. 'I believe the best time of year to grow crops is at the end of spring because there is a good amount of rain and sun usually, but there hasn't been in the past two years due to climate change,' complains Mr Smith. With more droughts in the summer, more crops are failing and it is becoming increasingly hard to grow certain crops but easier to grow others. 'I believe climate change is affecting crop growth and something needs to be done to prevent this.' If nothing is done, what is the future for allotments?

Our opinion

On the opposite page the climate change group representing Worle Community School, also known as The Larter-Lot, express their opinions on global warming...

'I think it's terrible, if all these materials are being wasted, what will the future be like?!'
Nicole

'I reckon global warming is bad because it stops the growth of natural plants and encourages GM products.'
Stephen

'Well, it's all bad, it's bad for us, it's bad for crops, crops that are meant to be grown in a cold climate.'
Cearan

'It's not a good thing at all, but what can we do?'
Mollie

KEEP THE SEA POLLUTION FREE!

How long things take to break down

Plastic bags: 20–1000 years

Plastic containers: 50–80 years

Foamed plastic cups: 50 years

Plastic bottles: 450 years



More and more villages and towns have become plastic-bag free to take action against climate change and carbon footprint, including Crediton on 1 November 2008. The mayor of Crediton attended the celebration day and signed a charter designed by Queen Elizabeth's Academy Trust. More than 90% of the shops in Crediton cooperated with the plan and 1000 environmentally friendly jute bags were given away on the High Street and Town Square. Even London had hoped to become plastic-bag free by the 2012 Olympics – the strategy being that shoppers would bring in their own, reusable plastic bags and shops would charge for single-use bags.

But is it enough?

When virtually everything we buy is wrapped excessively in layers of plastics that get thrown away as soon as we unpack our shopping, it becomes hard to remove the consequences that easily. 'Plastics: made to last forever, designed to throw away,' says the website www.5gyres.org. The story doesn't end at landfill sites, as some may assume, because almost half the rubbish we throw away gets blown off landfills, and ends up ultimately in the sea. Rubbish that ends up in the sea wreaks havoc on our marine life, and when there's an average of 46,000 items of rubbish floating in every square mile of salt water on the planet, it results in billions of marine wildlife and sea bird deaths every year.

Gigantic amounts of plastic rubbish collect in gyres, massive slow-moving whirlpools, where it sits slowly breaking down into smaller fragments but never completely disappearing. When marine life comes into contact with human trash the consequences are drastic. Animals can eat the plastic, mistaking it for food. For example, sea birds can mistake silver wrappers for small fish, while turtles can mistake plastic bags for jellyfish. The plastic bags can choke the turtles, or when swallowed will not be digested but instead will line their stomach – making their body act as if they were full, often causing starvation as the turtle will not eat afterwards.

Entanglement is also an issue, as when animals are caught in rubbish it is very difficult for them to untangle themselves, not having hands or feet as we do. 'Turtles' bodies start to grow around the plastic and the animal can even get strangled if they get it caught around their necks,' says Lauren Humphrey of Plymouth National Marine Aquarium. She also highlighted the issue of animals using plastics like they would ordinary materials. 'We are starting to see animals that will be living in bits of plastic. They have started using it as habitats and territories. So in the next 50 years it might change in the environment in that respect as well.'

Many organisations are trying to solve this worldwide problem. The problem is, even if we could remove all this rubbish, which would cost billions, what would we do with it? We can't burn it as it would release huge amounts of carbon dioxide, adding to climate change. We can't dump it in landfills as there is not enough room and some of it would end up back in the sea! The best strategy is to educate people and minimise all amounts of rubbish. We didn't always use so much packaging in everything, so why can't we now?

So, yes, in a way it is enough: small things like Crediton and other villages and towns becoming plastic-bag free may seem insignificant, but little things like that make a difference. And, step by step, maybe one day we will be a more environmentally friendly planet.

Farming in new weather

Climate change has been on the news a lot recently and it is also included in adverts, posters and radio broadcasts. The media shows how it affects polar bears and a range of other animals. Yet they somehow fail to show how it affects farming and local communities. It doesn't just affect arctic and sea animals, but local livestock as well. Local communities have been affected by the differing weather caused by climate change.

Farming is affected by the weather in different ways. Due to extreme temperatures, many crops and livestock will not have adapted to their new environments, causing them to die or not grow efficiently. It can also damage farming equipment with things such as frost or floods. It delays the farmer's precious time. Arguably, farming has a small contribution to the changing weather. Farming equipment is big and uses lots of fossil fuels to run, creating more greenhouse gases that can be released into the Earth's atmosphere (such as carbon dioxide). To lower this, farmers are trying to decrease the amount of diesel they use.

The reason we interviewed a local person is so that we could get a better understanding of how climate change is not only affecting farmers, but the local community as well.



Interview with a citizen from Newent

How has the weather changed in the past ten years?

'There has been more snow regularly; however there have been wetter summers and warmer winters.'

What do you know about climate change?

'There are strange weather patterns that have been occurring, and ice is melting in the North Pole.'

How will changing weather affect your daily activities?

'During summer, there will be less outdoor activities, due to rain, and my children will lose days of their education as their schools close due to snow and flooding.'

Interviewing a local farmer is a good way to find out how local farms are affected by climate change.

Interview with local farmer Mr Smith

We asked him, on a scale of one to ten, how has climate change affected your farming?

'Two or three – floods made it difficult to farm.'

Another question was, are the machines more efficient?

'Yeah, more than they used to be.'

The last one was about extreme weather and the farm in general.

'The lack of water causes stress to crops, however the dry summers are beneficial to the crops. There is lots of technology on the farm. Even though the machines are more efficient, tractors give out more pollution. The fuel for tractors is expensive and has an impact on the environment, so we are trying to cut back. The increasing pollution levels have made life difficult for the past couple of years. Cows cause pollution through methane, but cattle are now growing at a much slower pace.'

The changing climate is having a steady worsening effect on farming, which over time will lead to less crops and cattle being produced, so there will be less food to feed the population.

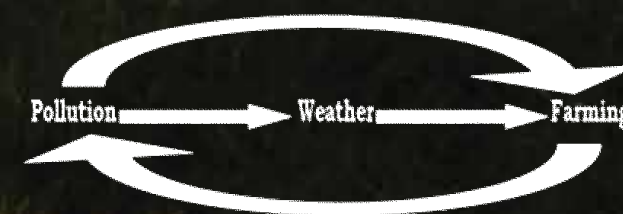
Extreme weather comes from climate changes, the ones most affecting farming being droughts and floods. These have no particular pattern, so farmers can't prepare their crops or cattle for the weather. More farming will start to fail as there is no exact way of predicting when droughts or floods will come. Farmers will start to lose money as the number of products they sell will go down a considerable amount due to crop failure.

This isn't good news for our world's future, as more people will go hungry and fewer jobs will be available as there will be less to sell. Local shops and markets will also suffer as there will be less food to sell.

Using renewable energy sources could be an answer, as not as much pollution would be made, meaning it would have a smaller effect on farming. More oxygen would then be released, as the number of trees would only increase as none would be spent on creating energy.

Solar panels are already in place in Mr Smith's farm and he is trying to cut down on the amount of fertiliser and diesel he uses in his day-to-day life on the farm.

Something needs to be done about the amount of pollution, and FAST!



➡ Effects (what the arrow is pointing to)

The diagram demonstrates that pollution affects farming and the weather and that farming affects pollution. It also shows that the weather affects farming.

Is Chester Zoo environmentally friendly?

Animals

There are 8000 animals at Chester Zoo and 400 different species of animals, half of which are endangered. Chester Zoo helps to conserve thousands of animals that are in danger of becoming extinct in the wild. They all have their own breeding programme and are often successful in breeding. For example, three cheetah cubs were recently born at the zoo, along with three Visayan warty pigs. Therefore, the zoo is helping the environment by breeding and conserving endangered species.

Food and income

A major expense in any zoo's budget is its food bill, and Chester Zoo is no different, with mouths to feed ranging from corals in the aquarium through to rhinos and elephants. Their food bill to satisfy these diverse appetites approaches £1000 per day. To battle this, the zoo has entry fees. However, how many food miles are being clocked up by having all sorts of exotic foods brought in? How much pollution is being brought into the air because of this zoo?

Alternative power

Chester Zoo is one of the UK's biggest zoos, but how much electricity is used by the zoo on heat lamps, lights, computers, etc.? One of the ways the zoo could help stop pollution is by using alternate power such as setting up wind turbines and solar panels to produce electricity. Yet we saw no source of alternative power at the zoo.

Biomass

Biomass would be a perfect source of alternative power for the zoo. With 8000 animals at the zoo all producing waste, they could use biomass to power the whole park. Biomass is where organic matter (such as wood, straw, manure and wood waste) is burned to make heat, steam and electricity. It is a renewable energy source. With the amount of waste that is produced by the animals, they could power most of the park for free.

Summary

Although the zoo isn't very eco-friendly, that can all be cancelled out by the work the zoo does conserving endangered animals from extinction. Even though the zoo could make a lot of improvements to become greener, all of which are very simple solutions, the work they do cannot be ignored.

Chester Zoo is one of the best zoos in the UK, and one of the biggest too. But even though they are conserving hundreds of animals, are they eco-friendly? We are going to find out for you by looking at every aspect of the zoo to decide how green they really are.



Ice, ice maybe



Carbon sinks

A carbon sink can be a natural or artificial reservoir or store of carbon that is built up over time. The formation of carbon sinks allows carbon dioxide (CO₂) to be removed from the atmosphere and stored. Carbon sinks can help reduce the greenhouse effect because they can significantly reduce CO₂ levels in the atmosphere. Some important carbon sinks on Earth include:

- Rainforests and living plants where carbon is stored in leaves and wood
- Organic material in the soil (humus)
- Carbonate minerals in rocks like limestone and calcite
- Oceans, where CO₂ is dissolved, exists as particles or is used to make 'homes' for living organisms, e.g. shells and coral

Carbon cycle facts

Carbon is the fourth most common element in the universe, fifteenth most common element in the Earth's crust and the second most common element in the human body. Scientists think that 99.9% of organisms on Earth are made up of carbon. The carbon cycle maintains carbon levels on Earth. Carbon dioxide and methane emissions into the atmosphere could affect the balance of the cycle and result in global warming and climate change. To keep the carbon cycle in balance we will have to rethink what we're doing by controlling greenhouse gas emissions and the amount of energy we're wasting every day. Recycling is a human way of helping the carbon cycle deal with the demands of our modern economy.

Solutions to global warming

Hybrid cars, also known as HEVs or hybrid electric vehicles, are seen by some people as the solution to the environmental problems caused by cars and road transport. Hybrid cars are powered by two sources, an internal combustion engine and an electric motor. Hybrid cars don't need to be plugged in to have their batteries charged because they can get ample charge from the movement of their wheels and storing the kinetic energy that is generated through a process called regenerative braking.

At present hybrid cars can get up to 60 miles to the gallon on the road, which means less fossil fuels are used. This means that hybrid cars have lower CO₂ emissions and make less of a contribution to global warming. In the future hybrid cars may be able to get 190 miles per gallon!

Other ways we can reduce CO₂ emissions in our area are:

- Walking, running and cycling
- Car sharing
- Use public transport
- Eat locally produced food
- Eat less meat
- Turn down the heating in your home
- Reduce the amount of electricity used in the home
- Use renewable/green energy like wind, solar and water power
- Use energy-efficient electrical devices
- Insulate your home

Local issues

Pollution, temperature changes, rising sea levels, melting icecaps, natural disasters, water shortages... These are all the result of global warming, but what are the more local issues?

With more cars on the road and cities using greater levels of energy to power things, what can we expect to see in our own areas in the next few years? After carrying out a survey in our school we found out that the most common cause our area was contributing to global warming was car pollution.

One of the busiest roads in our area is full of vehicles every day, with people driving to work, going shopping, dropping kids off to school and taking other journeys. Many people have seen the drastic changes in our community and many have said they wanted to help. Everyone we asked said that themselves, and their community, could do more to help reduce global warming. Some said they would try and take local transport more often instead of travelling in one car. A lot also said that recycling should become compulsory, especially in schools and in workplaces. If these issues occur in your community try to change them and get others involved too!

Hybrid cars

Prices of hybrid cars are around £1000 to £2000 higher than for a normal petrol or diesel car. That is set to change soon. However, tax on a hybrid car is less than on a normal car due to lower emissions of CO₂. In and around London, owning a hybrid car can mean a 100% discount in congestion charges, which can mean a saving of £2000 annually. Hybrid and electric cars are seen as the way forward for many people.

Most cars use petrol and diesel, which are hydrocarbons. A few use LPG (liquefied petroleum gas), which is another hydrocarbon. Hydrocarbons and oxygen produce CO₂ during combustion. CO₂ acts like a blanket over the planet, keeping it warm. If there is too much CO₂ it can cause the Earth to get hotter. This happens because the short-wave radiation from the Sun gets changed to longer-wave infrared radiation when it hits the Earth's surface. The heat is then trapped by the CO₂, causing the global temperature to increase. The gradual increase in the global temperature because of higher CO₂ levels in the atmosphere is called the greenhouse effect.

Fossil fuels

Fossil fuels are hydrocarbons and they include coal, oil and natural gas. They were formed hundreds of millions of years ago, from the remains of prehistoric organisms. They are helpful because we can use them for fuel in cars, trains, lorries and planes. The whole global economy is based on fossil fuel use. Road transport around St George and Bristol means that vast amounts of fossil fuels are burnt by vehicles, so CO₂ is released into the atmosphere. This means road traffic can make a contribution to global warming and climate change.

Effects of climate change on people

The poorest areas in the world are the ones that are most affected by climate change. In recent years, multiple natural disasters devastated millions of people. The Pakistan floods stranded families and left them without food. The earthquake and tsunami in Japan started a whole new debate about nuclear power and its problems. And drought left many people in Africa starving and thirsty. We are now being told that if we don't conserve water in Britain we may have terrible droughts like the ones in Africa, right here in the UK.

Climate change can affect sea levels and the Earth's temperature. This is why hurricanes have only recently been linked to climate change, because sea temperatures have only started rising in these past ten years, and to create a hurricane you need warm water and air, usually near the Equator. If we continue to increase climate change, its effects on people will get worse. And with disasters such as Hurricane Katrina, where 1836 people died and thousand of others were left with no homes, if we don't want events like these to continue to happen more often, we all need to help with reducing fossil fuel burning, carbon footprints and climate change itself.

Get your turbines off my yard!

Would you like to be £11,000 richer? Well Coleford could be, if the plans to build a wind farm are carried out. At Poolway Farm there are plans to build 86-metre-high wind turbines, stretching from Coleford to St Briavels, although not all see this as an advantage. For example, one campaigner said, 'It was obvious in our public meetings that the overwhelming majority are against the turbine.' If this is correct then the council may have a petition to deal with.

You kids are probably thinking now, 'Why don't these people want £11,000?' I mean, you guys could have a skate park, 3D cinema, better parks, an internet café or many other things if the turbines are built. Then again it could take years for this money to come, and you'll be all grown up then. Mike Thomas, chairman of the campaigners, added: 'We believe that if this planning application were to succeed, Coleford would be the loser while the developer and the manufacturer would walk away with the equivalent of a big lottery win.' One of the main fears of the campaigners is that there will be fewer visitors to Coleford, in turn reducing the income of businesses in the town.

On the other hand, entrepreneur Ronald Kear wants to put up the turbines, which will sit about 400 metres from the nearest houses. Ronald Kear also stated to the *Citizen* newspaper: 'The turbines are being built by the German firm Enercon, the quietest on the market. Although we have talked to both the campaigners and the council the campaigners haven't yet given a reason for their opposition to the scheme.'

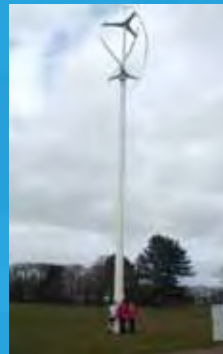
One reason some campaigners are against the wind turbines is that the cost will deprive Coleford of money (for a few years), although the power itself is going to a good cause, powering 670 homes and the local hospice – which makes it sound like a good idea, right? Well, despite this the protestors continue on their campaign. The campaigners' fear is that the turbines will open an opportunity to bulldoze the forests and build more, plus the turbines will drive away the local inhabitants, such as the birds, bats and badgers. Proof of this is the fact that nine eagles were killed in ten months!

In conclusion, although the benefits of the turbines are great, the people are the ones who must decide, as they are the ones who will or will not benefit from the turbines. If the county know the Forest of Dean though, they will know we don't give up easily, as seen in the Hands Off Our Forest campaign, which we did win. So we won't go down without a fight this time! Although I'm with what the people think, it is up to you to do what you think is right.

The UK has a target to produce 15% of its energy from renewable sources. Should our area join in? At Lakers School we have our own wind turbine which stands around 10 metres tall. It reduces the school's electricity costs by around £1000 a year.

An area of undisturbed beauty. In 2011 local people successfully fought to prevent areas of the Forest of Dean being sold, through the Hands Off Our Forest campaign. Could a wind farm be the next threat?

'Why don't these people want £11,000?'



Climate change in the UK: is Llanelli going under?

Our atmosphere is changing, causing sea levels to rise, and this is affecting many things in the area. This is a danger to animals, people, the houses, habitats! Some people think global warming is a myth, but flooding is a reality. Unfortunately the people of Llanelli are blissfully unaware of the issues.



Climate change, global warming, melting icecaps, rising sea levels. All of these are linked to the burning of fossil fuels to power our modern world. When carbon-based fuels are burnt they produce carbon dioxide (CO₂). CO₂ absorbs thermal energy which reflects off the Earth's surface. Whilst this has been happening for millions of years, the increased amount of CO₂ in the atmosphere means that ever more of the Sun's energy is being 'trapped', leading to an increasing atmospheric temperature and ultimately causing the rapid melting of the polar icecaps. The South Pole icecap contains 60–70% of the Earth's fresh water, and if this was all to melt it would result in an average sea rise of 70 metres! This is not likely to happen, but more likely

is if the ice sheet covering Greenland were to melt a global rise of 7 metres could be expected.

Llanelli is at risk of severe flooding as much of the town is located below sea level. A relatively small sea level rise of 7 metres would leave most of Llanelli submerged, and only small islands of land remaining. Given that tides can raise sea level by around 4.5 metres, many businesses, such as those in the relatively new Trostre Retail Park, could be severely affected. Homes, schools and the hospital are also at risk should our sea defences be breached. The devastating effects of such events were seen in New Orleans, a major city in the world's most powerful country that is yet to recover, with many families displaced and still

waiting to find a permanent home. Beyond the human cost is the threat to unique natural environments, such as the Burry Estuary that spans from Llanelli to Penclawdd, the wetlands bird and nature reserve and Pembrey Country Park. Llanelli is one of many towns throughout Britain under threat from rising sea levels.

Following our research on flooding in Wales, and specifically the threat of sea-level rise posed to Llanelli, we discovered that quarter-of-a-million-pound houses are being built in a flood-risk area by a major housing developer. As well as the new homes, Trostre Retail Park, a relatively new development, is in a flood-risk area, meaning that it too will be flooded. A lot of money has been put into this retail park and it will all be lost. Several

developers are building houses right next to the sea, with even a proposal for a hotel and leisure complex. The new developments are all in a flood-risk area, so why are they being given permission to build there?

When questioned, a member of the local council planning department, a Future Planning Officer, stated that they gave the major developers permission to build because all had said they would make the area safer by raising the level of the land. Current planning applications are based on flood-risk evidence provided to the council by the Environment Agency. However, this information does not provide future possible sea-level changes. Future developments need to be granted permission with consideration to their sustainability.

We interviewed a variety of people in Trostre Retail Park about their understanding of the problems facing Llanelli and the sudden boom in housing development between Llanelli and the sea. More than a third of those interviewed did not even know of the risks posed to the town. Of those who were aware, many spoke of a concern regarding the situation in light of the recent large-scale housing developments. There was a real uncertainty amongst the public about their impact on the town and the need for more governmental intervention in the form of improved coastal defences. One person interviewed expressed concern about future residents being unable to get insurance on the homes built in these at-risk areas.

ACID BATH

We all love wandering around the new shopping centre in Bath, Southgate. It's modern, new and clean. Yet, look at all the other buildings in Bath. When they were first built people probably thought the same about them: modern, new and clean. Now, we look at them with disgust as they are coated with black soot from constant car fumes and misshapen with growing erosion. Is this how we want Southgate to end up? Because if we continue this way, then it won't be long before it starts to look the same.

Coal was the main fuel for domestic heating in Bath until the 1950s and 1960s. Many factories would also use coal to fire boilers for heating and steam power. The fumes were rich in sulphur dioxide, which was converted into dilute sulphurous acid (acid rain) by rain. This was the main cause of the damage to stonework in Bath today.

Bath stone is a type of limestone made up of small fragments of calcium carbonate and its honey-coloured appearance gives bath its distinctive look. Acids from acid rain have a corrosive effect on limestones, of which Bath stone is made up. The damage becomes obvious as the stone surface starts to crumble and flake away, but by the time we have noticed it the damage has gone much too deep.



Acid rain

Once the sulphur dioxide (SO_2) and nitrogen oxide (NO_2) have been emitted from vehicles into the Earth's atmosphere, they mix in with the water droplets that form with the clouds above. SO_2 and NO_2 dissolve easily in water, and so find it very easy to react with the water, oxygen and other chemicals in the air. When reacted with these things, the two compounds form acidic pollutants, which means that they have become an acid and are more commonly referred to as acid rain. The two compounds SO_2 and NO_2 are very light and can be carried easily by the wind once they have become part of rain.

Acid rain has a corrosive effect on buildings. One reason for this is that the presence of SO_2 in the rain increases the natural corrosion rate of buildings by normal rain. Many limestone sculptures have been destroyed or permanently damaged by acid rain. This is because sulphuric acid (the main acid in acid rain) reacts with limestone (which contains calcium sulphate). Calcium sulphate is soluble in water and therefore the limestone building or statue crumbles away.

Dream cars?

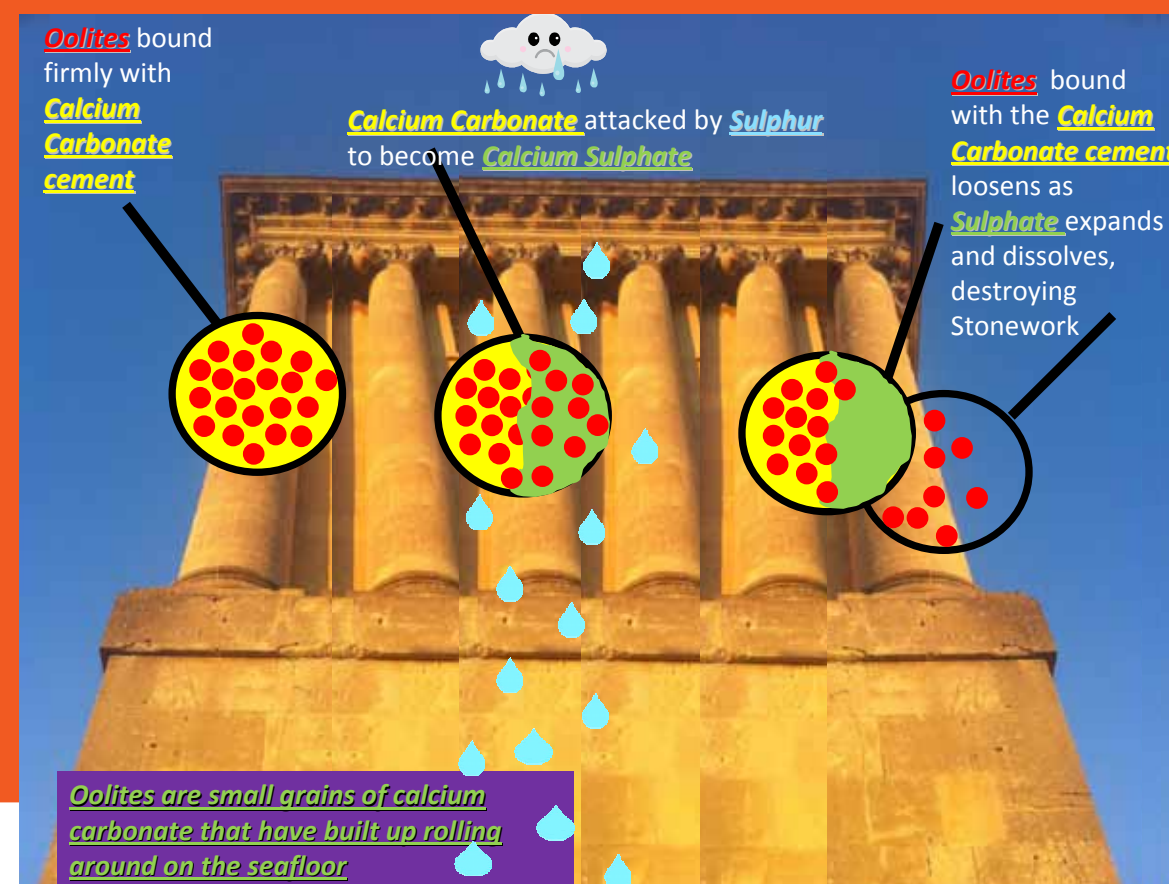
What is your idea of a dream car? Small and fast or big and flashy? But would it still be your dream car if you knew what it did to the environment? On average every year a four-by-four emits well over 8725 pounds of carbon dioxide (CO_2). And with the increasing number of vehicles on the road every year, just imagine the effect it is having on the environment! In an approximate total there are 3921 parking spaces within all the car parks in Bath. And if they were all full that would mean 34,210,725 pounds of carbon potentially could be being released into the air around us – the air that we breathe, the air that we depend on.

So what can we do? Over the past few years, new vehicles have been developed, ones which are not only cheaper to run but emit less CO_2 and are therefore better for our environment. These include diesel-engined vehicles, battery-powered vehicles and even hydrogen-powered cars which emit only water!

Cars give off harmful emissions and by driving every day we release these gases into the environment. As an alternative solution to travel in these destructive vehicles, the possibilities of eco-friendly transport are infinite. Here are some examples:

- Walking
- Cycling
- Public bus
- Train
- Coach
- Running
- Tandems
- Rollerblades
- Skipping
- Skateboarding
- Ripsticks
- Go-carting

Or for more fun:



Together, we can clean up our planet!

Climate chaos kills helpless hedgehogs

It's not just humans that face an uncertain future due to global climate change. Polar bears, tigers, leopards, sea turtles and even our local hedgehogs are affected by this rising danger. Sea animals are affected by the warming seas – for example sunfish from Florida have been seen in English waters for the last few years. This massively affects our local sea life. Also, one of the world's largest populations of tigers may disappear by the end of the century as rising sea levels caused by climate change destroy their habitat along the coast of Bangladesh. Here at home it is our charismatic hedgehogs who are feeling the heat.

Hedgehog numbers are declining in the UK. Researchers believe this is partly due to the harmful effects of climate change. In 1950 scientists estimated that nearly 30 million hedgehogs lived in the UK, but a 1995 survey recorded only 1.5 million. We don't know how many hedgehogs are left today, or how long they will survive in the new climate and habitats. You can help us answer this question. In 2012 the People's Trust for Endangered Species (PTES) and the

British Hedgehog Preservation Society (BHPS) are leading a survey of hedgehog numbers and when they emerge from hibernation between February and August.

Dr Pat Morris established that climate had a direct impact on hibernation patterns of hedgehogs with research done in the 1970s. Because of climate change, hedgehog hibernation patterns are being affected by temperature changes and food shortages. As our climate becomes more unpredictable, some hedgehogs hibernate too early, leading to starvation, and some hibernate too late, affecting their fat reserves and breeding times. The PTES and BHPS suspect that hedgehog numbers may have dropped by up to 25% since the last survey.

The same actions that slow climate change would benefit hedgehogs as well as the other animals in our country, including us humans. To slow down or even stop the eradication of the helpless hedgehogs and save ourselves, we need to use less energy and fossil fuel. The Department of Energy and Climate Change is working to reduce the carbon

released in our country by 80% by 2050. By investing in renewable energy, reducing your carbon footprint, and recycling you could actually be working towards keeping your local hedgehogs from extinction in the wild.

Climate change is a global problem, not just to people worldwide, but also to the animals that inhabit the world with us. Hedgehog numbers are rapidly decreasing due partly to climate change. To help hedgehogs, and all other animals, we need to stop climate change before climate change stops us.

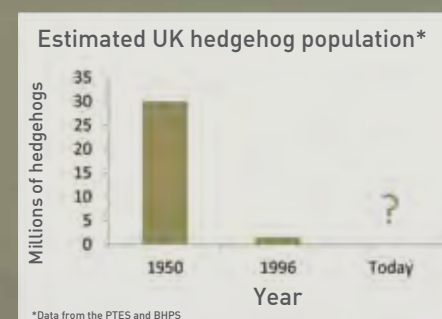


Image: Dries Buytaert

The background is a solid orange color. Overlaid on this are several semi-transparent, tilted rectangular signs with a halftone dot pattern. Each sign has the words "NOT TODAY!" written on it in a hand-drawn, slightly irregular font. The signs are arranged in a way that they appear to be floating or layered over each other. In the top right corner, there is a small white square with a grey shadow, giving the impression of a page being turned.

Community

How are our schools and communities tackling climate change?

Say YEP to saving energy!

The YEP (Young Energy People) have a mission to stop people from wasting energy at home and in schools. Chosen Hill School has a group of students who are working on this and has also supported the charity Severn Wye Energy Agency (SWEA) in the 2011 Ashden Awards. The SWEA were finalists in these awards (the 'BAFTA's for sustainability!'), which each year recognise life-changing ideas that help people all around the world. Previous ideas have included solar lamps in rural India and low-carbon buildings right here in the UK.

The Chosen Hill School (CHS) YEP group have saved the school around £5500 by organising several events here at school, such as the 'Lights Off Day' and the 'Loving CHS' campaign. YEP worked with the CHS Green Group to get students from different years collecting rubbish in the school playground on different days of one week, and the year with the most rubbish won a prize. The Loving CHS campaign also included a 'Shutdown Fortnight' where all staff and students encouraged each other to shut down electric appliances instead of leaving them on stand-by. Never

underestimate 'student power' to persuade teachers to change their energy use habits!

We spoke to one of Chosen Hill's YEP representatives, Charlie Hughes, to ask him about what YEP do and how it affects schools. According to Charlie the YEP group's main priority is 'to save money and energy to buy more resources for school'. YEP are also about 'changing people's habits'. Charlie also described most people's current opinions towards the energy they use unnecessarily as 'selfish and unaware'. The YEP group have been around

for two and a half years, and Charlie spoke on behalf of the YEP team here and said, 'We are starting to change people's habits.' The £5500-plus saved because of the campaigning by the YEP has been put to use helping to pay for double glazing. Hopefully the YEP from Chosen Hill will continue saving money and changing people's views on energy, from the people of Gloucestershire to people all over the world!

YEP is a European project set up by the charity Severn Wye Energy Agency.

Have you 'shut down' today?



waste not want not



Our green school

Our school has three sets of green power sources. But how can we use the energy gained effectively?

L Centre solar cells

Total energy generated to date:
33,321.74 kWh
CO₂ prevention to date: 17,427.27 kg
Estimated saving to date: £4500



Saved quite a lot. More all over the school could make a real difference.

C Centre solar cells

Total energy generated to date:
26,202.62 kWh
CO₂ prevention to date: 13,703.97 kg
Estimated saving to date: £3500



Saved more than a turbine and has been installed for a shorter time! This shows its effectiveness.

S Centre turbine

Total energy generated to date:
2854.70 kWh
CO₂ prevention to date: 1493.01 kg
Estimated saving to date: £380



It's just not very effective alone! We need more of them or it needs to be bigger; doubling the length of the blades quadruples the power.

What does that mean?

A kettle needs 0.15 kWh (kilowatt hours) to boil.

With the L Centre solar cells we could have boiled a kettle 222,144 times.

With the C Centre solar cells we could have boiled a kettle 174,684 times.

With the S Centre turbine we could have boiled a kettle 10,901 times.

That's nearly half a million cups of tea or coffee, and all of this kettle-boiling energy is pumped into the national grid!

But there are also the little things. Writing on both sides of the paper or using pure waste paper (paper made from woodchip waste left in sawmills) could save trees and thus help the Earth's natural processes take in carbon dioxide and produce oxygen via photosynthesis. Things like turning lights off when they are not needed can help too, as can turning off your TV rather than leaving it on stand-by. Most of these cost nothing, so rather than buy an expensive eco-friendly power source, why not just save energy?

Where are the heroes?

Eco-warriors do good all over the world, yet they don't get their fair share of the limelight in the media. It is carbon-burning celebrities who cover the surface of every magazine all over the world, but why? Eco-warriors have helped world problems and raised some awareness about global warming, but still they are not getting the attention they deserve! The Hinkley Point nuclear power plant in Somerset has been their latest target. A power plant produces 1600 megawatts of energy or more. If that blows it could be as much power as a nuclear bomb and this could devastate the whole of the west of England.



Rubbish fashion - the new look!

Have you ever seen a model styled in recycled fashion? Have you ever wondered what it would be like if we all went around wearing rubbish? Well, OK maybe not, but we have! Rubbish fashion is coming into style with dresses, skirts, tops and accessories being made by recycling what we throw away. The world uses 32,000 plastic bags every second, which equates to around 1 trillion a year, and only 3-5% of these are recycled while the rest add to the 30.5 million tons of rubbish that ends up in a landfill site each year. On this dress we have used an old black vest top, a bin bag and lots of other scraps from plastic bags. This new style maybe isn't hitting the designer catwalks or being sported down the red carpet just yet, but as the world becomes more eco-friendly so should our clothes! Using recycled materials benefits the environment and a new era for the fashion scene is just round the corner, hiding in a landfill site! The new trends are disguised as rubbish in your bins, but you need to see their true beauty! So get creative and try out your own rubbish fashion!

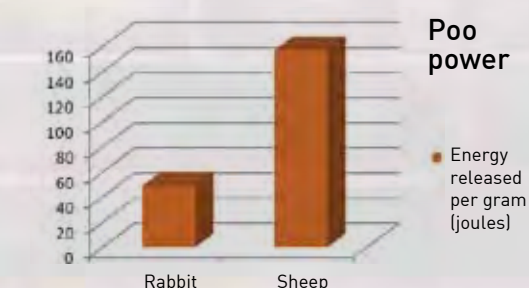


The power of poo - fuelling the future...

The human race is continually consuming more and more of the Earth's resources to keep up with our greedy, selfish lifestyles. We need to find alternative ways to fuel our planet; and fast, as non-renewable fuel reserves are running out!

Biomass is the revolutionary fuel of the future. It involves plant or animal materials either being burnt or broken down by microorganisms to create fuel to power vehicles or generate electricity. Biomass is a way of recycling waste products, and where better to start than with the ultimate waste product, poo? We wanted to investigate the possibilities of using poo as fuel and which animal creates the most powerful poo! So we collected sheep, rabbit and chicken poo and conducted an experiment to work out how much energy each one produced. We used poo to heat water, and measured the temperature increase of the liquid and then calculated the results.

Though the chicken poo was unsuccessful, we received brilliant results from the sheep and rabbit poo. The sheep poo was the first to light and caused a 13 °C temperature increase; the energy released was 1092 joules or 157 joules per gram. The rabbit poo lit next and heated the water by 6 °C, releasing 504 joules or 49 joules per gram. This shows that sheep poo is three times more efficient than rabbit poo and is therefore the best fuel to use when replacing other fuel sources, as it produces the most energy out of the three types of poo we investigated.



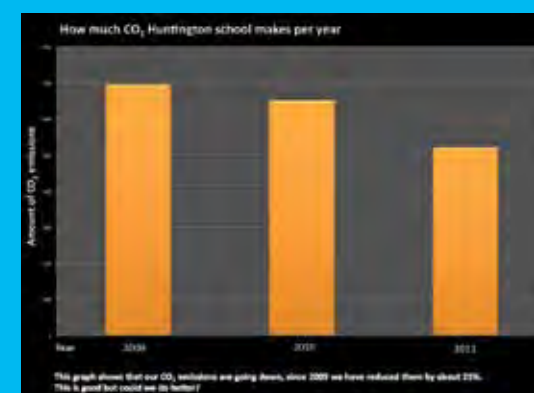
Should schools spend to save

CO₂?

Should schools be spending to improve their impact on the environment? Is this a wise investment for the future?

York High School, York, has a wood-burning stove, which keeps the whole of the school warm. Joseph Rowntree School, also in York, has just had a complete renovation, with energy-saving windows and wall insulation, aiming to save energy, money and the planet.

Here at Huntington School, York, we have been looking into how we can try to reduce our carbon footprint. We interviewed our head teacher, our campus director and an energy manager for City of York Council, to find out how we are trying to save energy, and critically, if they believe spending money on ways to cut our carbon dioxide (CO₂) emissions is a wise investment for our school, and schools in general.



John Tomsett, Head Teacher at Huntington School, tells us how the school is cutting its CO₂ emissions

'We are doing a few things; we're sending far fewer people out on training. That reduces carbon footprint. We were talking only this morning at a meeting about having "turn it off" stickers in each classroom. One thing that really bugs us is teachers leaving projectors on. It burns up the bulb and takes up electricity and we have got to do something about that.'

'We've saved a huge amount on paper in the last couple of years and we were discussing this morning how we're going to be draconian in

our reduction of printing for students. Now students will be allowed to print hardly anything because they seem to waste lots of paper.'

'What I'm really pleased about is how many student bodies there are that are concerned with environmental issues.'

'I think there are real difficulties about it because we're at a point, both locally and nationally, where we've stopped investing in green technology because there is no money because we are living in an age of austerity.'

Sixty-second interview

Jeff Poole, Premises Manager at Huntington School

Do you think that climate change is an important subject to teach about in school?

'It is important that future generations fully understand the impact of climate change and what we can all contribute in reducing this impact.'

Do you think our school's carbon footprint is too big?

'We have recently had some major capital investment to improve our heating system, including new energy-efficient boilers, pipework and insulation lagging. Our energy certificate over the last three years suggests that we are reducing our carbon footprint.'

How would you choose to reduce our school's carbon footprint?

'Funding is not readily available for major projects unless it is a high-priority building

maintenance issue, so my view would be to educate more and change people's culture on how they can help.'

Why do you think the council didn't spend enough money on double glazing?

'Many of our buildings were built a long time ago when climate change was not fully understood by everyone. All our new buildings on site are built to strict standards which include double glazing.'

How much money does the school get per year for maintenance?

'At present we have a budget of approximately £99,000 for maintenance and repairs to the buildings. This may sound a lot of money; however our buildings are very old and need a lot of care.'

Do you think that our school's carbon footprint is worth spending money on to reduce?

'Yes, anything that we can do to reduce the impact of climate change will be worthwhile for future generations.'

There are lots of interesting facts about the role schools can play in cutting CO₂ emissions, but it's clear that cutting emissions is not as easy as you'd think. Gary Christie, Carbon and Energy Manager for City of York Council, said that 'budgets are distributed evenly around all York schools in order of urgency and importance'. Therefore it is harder to get money to make a school more eco-friendly, because there are nearly always going to be more pressing matters at hand. Jeff Poole, Premises Manager at Huntington School, added, 'If we'd had double glazing, some schools would have been left with leaking roofs!' So you can see how hard it is to get the funds to cut down on CO₂ in schools. But climate change is a serious problem and it needs to be solved. 'It is important that future generations fully understand the impact of climate change and what we can all contribute in reducing this impact,' Mr Poole said.

After writing this report, we believe that schools should spend to cut down on CO₂ emissions, and that it is up to us to solve this problem before it's too late.

Schools fight to go green

Do you want to find out ‘who is the greenest of them all?’ and which school wins the ‘fight to go green’? If so, read on and all will be revealed...



At Bedale High School we are determined to be more economical. As the pupils of the school and future generations of the world, we feel that it is our duty to ensure an environmentally stable future for the local community and our school.

One of the ways in which our school has managed to be more environmentally friendly is by turning our electricity down by one degree throughout the entire school. This doesn’t sound like very much, but can save a lot of energy and money – even as much as 10% of a heating bill. By saving that money, we can embark on other ways to make the school more economical.

Believe it or not, the weather also affects energy usage. We are currently in the process of installing loft and roof insulation to make the school warmer. Another way we make sure the weather doesn’t affect us is the frost guard system that controls the central heating and how long it runs for in correlation with the temperature outside. This year we haven’t burned as much fuel because the weather hasn’t been as cold, but with weather patterns changing and winters becoming longer and colder, we might end up having to use it more.

In late 2010 we replaced our design technology (DT) block with a newer, eco-friendly version. The new DT block has cavity walls which will be filled with 12 inches of insulating material so that the warmth stays in and the cold stays out.

Cavity wall insulation has also been used in the hall, gym, apex roof spaces and the western part of the main school building. This insulation is 12 inches thick, but all other parts of the school have only 2 inches of old insulation material. This will make parts of the school much warmer, ensuring that the heating doesn’t have to be on as high, or used as often.

Currently the art block has a diesel boiler that is very inefficient: it wastes oil, produces a great amount of carbon dioxide (CO₂) and is expensive for us to run. If it were to be replaced, our energy bills would be greatly reduced. It would also benefit the school’s community because there would be less CO₂ emission to pollute the Earth’s atmosphere and increase the

greenhouse effect which raises the surface temperature of the globe. This has global effects such as glaciers melting, sea levels rising and will mean that some parts of the Earth suffer with extreme droughts and others flooding.

We also had plans to install solar panels, but unfortunately our application was rejected because of maintenance problems. We investigated installing wind turbines, but this requires planning permission and would not be cost efficient. This was disappointing, but our school will continue exploring alternative renewable energies to reduce global warming through the Earth Charter and working with staff, governors and pupils.

The school’s spending on gas, oil and water has only increased by a few hundred pounds a month, which is great because our school has made some massive extensions which would normally cost a lot more money, and (even with this small increase) we are still saving over £1000 a month on electricity alone!

Believe it or not, the weather also affects energy usage.

Who is the greenest of them all?

Bedale High School may be eco-friendly, but are others the same? We have what is called an efficiency band, which rates our energy use; our rating is D with a value of 98. This means that our school is getting better (it was an E) but we still have a long way to go until we reach the top.

We have been talking with other schools and gathering their efficiency ratings to compare with ours. We talked to several schools of differing size, including Le Cateau (Catterick), Topcliffe (Thirsk) and Bedale Primary School (Bedale). From our results we can see that we aren’t the best, but we aren’t the worst.

School energy efficiency	Category	Efficiency
Bedale Primary School	C	69–80%
Bedale High School	D	55–68%
Topcliffe	D	55–68%
Catterick	D	55–68%
Le Cateau	D	55–68%
Mowbray	D/E	39–68%

Are we stuck on red?

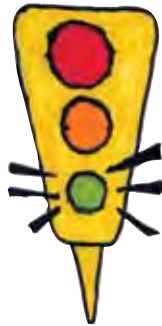
As you probably know, climate change is happening now and transport is a big factor in it, with some people saying that it contributes up to 15% a year to global warming! We need to act fast to stop it from getting worse. In Bedale High School a shocking 43% of pupils would not consider using a more economical way of transport. Almost half the students would let the planet’s global warming problems continue because they would rather travel in a normal car. This needs to change. Without change, global warming will get far worse. So how will we solve this awful problem? We sent two surveys around all the tutor groups in the school to see what their opinions were.

Our survey found that the majority of people took public transport when getting to and from school, but out of school public transport is used less than half of the time. When it came to cars, most people did not use them to travel very far, and a small minority of people used them to get to school. However, a minority of people – a mere 19% – actually think their mode of transport is already eco-friendly. An even smaller minority of people considered changing their mode of transport.

Public transport is always a better alternative to using cars, but if our school continues this way, we can only hope that the pupils’ current opinions will change through campaigning and

raising awareness in school of global warming issues and ways in which people can help to heal the planet. There is, and always will be, room for improvement in our use of transport. We’re not saying stop going out, but:

- Walk on short journeys instead of driving
- Using bikes more will always help
- Travel in vehicles only if necessary and either use public transport where possible or share a car to reduce the number of cars on the road



- Ways your school could be more efficient:
- Turn off lights when not in use
 - Turn off appliances when not in use
 - Always turn off taps or use automatic ones
 - Keep windows and doors shut to save heating energy
 - Recycle
 - Use compost bins
 - Encourage pupils to walk to school or use a bike
 - Use energy-saving light bulbs or movement-sensitive lights
 - Use automatic doors to keep heat in
 - Install solar panels on the roof or in a sunny area of the school
 - Install double-glazed windows

Is a new London airport plane CRAZY?

The rapid growth of air travel in recent years has catapulted aviation to the forefront in the war against climate change. We are Year 9 students, and in our lifetime alone the number of airline passengers flying into the UK has risen by over 75%, something which comes with a hefty environmental price tag. According to the European Union, between 1990 and 2006 alone, greenhouse gas emissions caused by aviation increased by a phenomenal 87%.

The possibility of one of the world's biggest airports being built in the heart of the Thames Estuary has therefore been met with considerable surprise by many. The airport could carry a further 150 million passengers into the UK every year – double the number arriving at Heathrow. It has been pointed out that there is a potential impact on climate change not only due to increased aviation emissions but also in terms of the carbon emissions arising

from the construction of the airport hub, which reports suggest could take 16 years and cost an estimated £50 billion. There could also be a direct impact on wildlife.

The golden plover and hen harrier are just two at-risk species of bird which live in the nature reserves of the site of the proposed airport. However, the estuary is not only invaluable for European wildlife but is also crucial for birds travelling as far afield as Siberia, Canada and north Africa. There is also a potential aviation hazard at this airport posed by bird strikes. Bird strikes, which occur when a bird collides with an aircraft and are a significant threat to flight safety, have risen from 7507 strikes in 2007 to an astounding 10,000 in 2009. It has been estimated that an airport built in the Thames Estuary would be 12 times more likely to suffer bird strikes than any existing major UK airport.



Time for change

Climate change is a topical issue and despite Penair School, Truro, Cornwall being below the national average in energy efficiency, the school is adopting a proactive approach to reducing its energy usage.

We need to get everyone on board.

The heat seeps out of the school like water dripping from a tap.

Penair recently found out that the school is below the national average for energy efficiency, and fourth worst in the county of Cornwall. This has worsened over the years and only now have they realised just how bad it has become.

Over the last year, Penair's Eco Club have upped their game in order to prove that they care about their school's energy rating. Having been awarded the Eco Schools Bronze Award, they are making steady progress towards their Silver Award.

The Eco Club originally started as a result of Penair signing up to the Eco Schools programme in May 2011. In their first environmental review, carried out in June 2011, they found that there was a lot of waste electricity and had no idea where it was going. Mike Shilston – Energy Performance Manager at Cornwall Council – commented that the school's next steps are to find out where the energy sources come from and what they can or can't turn off.

Since that review, Eco Club have been working hard to achieve their Eco School Silver Award. They are doing this by introducing recycling bins, which has greatly decreased their waste levels, and installing solar panels on the English block's roof to support their mission in becoming a greener school. These solar panels are expected to generate 11.3 megawatt hours of electricity and around the school save 6.1 tonnes of carbon every year.

They are also collecting used batteries, installing new eco-friendly hand-dryers, changing the heating controls, taking part in Switch Off Fortnight, putting red recycling bags in every classroom for collecting waste paper, looking at changing the old lights to LEDs, reducing the number of lights around the school and making them motion sensitive and, finally, the school are thinking about getting a bio-digester for the kitchen. All of this demonstrates Penair's proactive approach to improving their energy efficiency rating.

Eco Club have also discovered that students are taught plenty of ecologically sustainable subjects. In their last review (February 2012) they found that two big bags full of used batteries had been donated for recycling and the recycling bags that had been issued are being filled to the brim with lots of waste paper. The school is also beginning to address the areas where there is high energy usage.

Sam Edwards, representative of the Eco Club, reports: 'At the moment we are focusing on lowering our electricity and heating bills because our school is very old and loses a lot of heat out of our single-glazed windows and low-insulated walls. We also need to try and get everyone on board so that it will be a lot easier to lower our carbon footprint in general.'

Penair School's main building was opened on 20 May 1980 by Prince Charles, who originally owned the land Penair is built on. Because of the age of the building, as Sam pointed out, the school has encountered many problems with the heating. Because of the lack of cavity-wall insulation and the single-glazed windows, the heat seeps out of the school like water dripping from a tap.

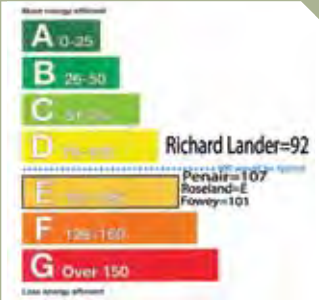
Malcolm Henderson – the architect of Penair's original buildings – said about them: 'I purposely put curtains in the windows to keep the heat in in the winter. I had to provide water for firefighters, so I installed a swimming pool' – which is not there anymore. 'I also made the roof of the school wind-resistant for winds of 110 mph and snow loads.'

Despite this, the main building's roof is unsuitable for holding solar panels for fear of them falling through because of their weight. Fortunately, the school's English block could withstand solar panels on its roof as it is a relatively new addition to the school. After asking Mr Henderson what he would add to the school if he built it again, he replied: 'Lots more insulation – solar panels, rainwater harvesting and switch off all the heating at weekends.'

Comparison of energy consumption ratings has shown that other schools in the local area are more energy efficient than Penair. Surprisingly, one of the newly designed schools in the area, Richard Lander – which you would think would be more energy efficient – were only slightly better than Penair. Falmouth School reported on what they do to save energy: timers on boilers, photocopiers and larger equipment; all computers are programmed to turn off at the end of the day; and solar panels, which they check regularly.

Fowey Community College were also discovered to be at the same level of energy consumption as Penair. Lisa Kelly, the Energy Efficiency Director of Fowey, is taking the same steps as Penair by using solar panels, replacing old lights with LED lights and also setting up an energy group within the school. Helston School also have timers on their computers and water-saving technology in all toilets. It is encouraging that other Cornish schools are taking a proactive approach to making their schools more eco-friendly and energy efficient.

Penair hope that their mission to 'go green' is a further success and since the formation of Eco Club, the school is taking the time to change.



Walworth feels the heat... but not for long!

The future is in our hands!

Global warming is when the temperature rises (when the Earth heats up). Many things cause global warming, but a major cause is burning fossil fuels to create electricity, as they release greenhouse gases which trap heat in the atmosphere. This is a global problem because icecaps are melting, sea levels may rise and drought and famine will become more frequent.

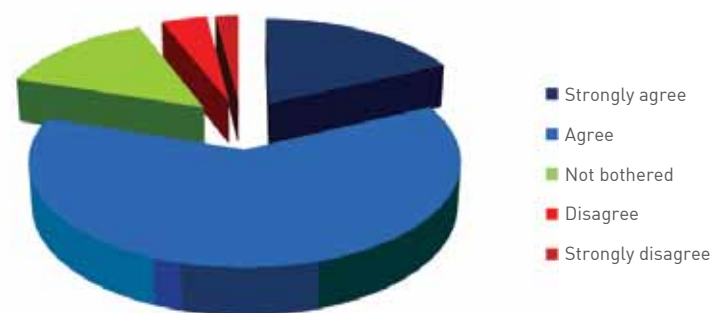
The Strata tower in Elephant and Castle is the tallest residential building in central London and is located less than a mile from our school. The designers of the tower claim that it is sustainable and from the outside this seems true; the tower generates electricity for the building from wind power and you can see three wind turbines at the top of the tower [see picture]. However, these three wind turbines only provide 8% of the building's power. Is this enough?

What are the benefits of wind turbines?

- The energy they produce is renewable
- No carbon dioxide is released
- Wind is free
- They are environmentally friendly

What are the disadvantages of wind turbines?

- They are expensive to build
- It isn't always windy, so they could be useless!
- Noise pollution
- Some people think that wind turbines are ugly (the Strata tower was even named the ugliest new building of the year by some experts)



Fifty students and teachers at Walworth Academy were asked how they felt about the statement 'I think all buildings in our area should have wind turbines like the Strata tower in Elephant and Castle.'

What do we think?

In my school 80% of people agree that there should be wind turbines fitted in all of the buildings in our area, and 40% of people agreed that they are environmentally friendly. In my opinion it would be good if all of the buildings in my area had wind turbines so fossil fuels will not be used up too quickly.

Climate change and Walworth Academy: an interview with the Academy Principal



Mr Hanson.

Mr Hanson is the Principal of Walworth Academy. We interviewed him to see what the school is doing to prevent global warming and have summarised his views. This is what he had to say...

Mr Hanson said it was important for students to save energy: 'I think it's important for you [the students], firstly because it is a global issue which needs to be addressed by individuals as much as by governments and businesses.' He also said, 'As a learning institution we are not just here to teach algebra and comprehension but to teach you to have a conscience ... learning how to protect the environment is as important as ABC 123!'

'Learning how to protect the environment is as important as ABC 123!'

When asked how the school saves energy, Mr Hanson described the lighting system which has been installed in the school: 'Within five minutes of leaving my office, the lights automatically switch off to save energy ... All classrooms and corridors are fitted with the same lights.'

During the interview Mr Hanson informed us that the school uses renewable energy resources as well as fossil fuels to power electricity. 'We have a new fuel system called biomass which means we aren't using as many fossil fuels to create electricity.' He also went on to say that he was interested in installing solar panels to heat the school and this is something he is considering for the future.

When asked if the academy is doing enough to reduce climate change, Mr Hanson admitted, 'I think we could do more. For example, sometimes computers are left on unnecessarily, which wastes energy.' Mr Hanson would 'definitely be interested in developing an environmental policy at Walworth' to ensure energy is not wasted, and we as a school are doing as much as we can to reduce the effects of climate change.

What has the Eco Schools Coordinator got to say?

We interviewed one of our teachers, Ms Partridge, who is the Eco Schools Coordinator here at Walworth Academy. Here is what she said:

'We must try to use less of our resources. However it would be better to reduce what we already use, as recycling still uses up energy; turning products into other products still needs energy! For example, when we go to buy some apples, buy them separately, not in plastic packages, to reduce the amount of waste produced.'

'We use recycling bins (boxes) in every classroom and office. We do mixed recycling, which is when you separate plastic from glass and paper, and organic waste such as banana skins. Also we are setting up eco groups to promote recycling and spread the word about protecting the environment!'

'We could encourage people to use less and put up recycling bins for all different types of waste in the dining hall. We could monitor the recycling bins and sort out the rubbish. We could also make sure the cleaners separate the rubbish to save time and energy.'

Did you know?

There are several theories as to where Elephant and Castle got its name. Which do you believe?

- Someone on London Bridge saw a cloud that looked like an elephant with a castle on its back.
- It was a mistake by people who were trying to pronounce the name of a Spanish princess, the Infanta de Castille, who was the wife of Edward I.
- It is in reference to gifts given to the king, who had lions, tigers and an elephant.

Kodak in Harrow, a snapshot of climate change

The Harrow Kodak factory has been an iconic site in the Harrow landscape for over 50 years. Throughout its time it has been at the forefront of technological change and has remained a talking point in the local community. With film no longer being produced owing to the lack of demand, there was no more business for the photographic film industry because it was very intensive and expensive. The historic site is being redeveloped into a brand-new role with every effort being made to limit its impact on the climate. This story covers its heritage, its future developments and the effect the development will have on climate change on a local scale and pollution on a regional scale.

Kodak heritage

The Kodak site is the oldest factory in Harrow; it is currently producing digital cameras, printers and ink. Back in 1891, Kodak bought 7 acres of farmland and built the first British Kodak factory, a photographic manufacturing plant. During the 1950s the Kodak factory strived to become the largest photographic plant in the entire country. At Kodak's peak the factory employed over 13,000 people. In this period Harrow was also at its peak population.

Mr Whelan, a former Kodak Factory worker, said,

I would like BLS to develop this site into houses and an industrial estate with small industrial units.



Kodak's Harrow factory was in use from 1891 for emulsion-making, paper-coating and for the processing and printing of customers' films. However, this process was dangerous because it involved silver nitrate and ammonia, both harmful to the environment and corrosive chemicals.

Did you know...?

The egg white needed to coat albumen paper for contact printing was supplied by a flock of a hundred chickens kept on the site.

Development

The Kodak site is going to be demolished in the next few years to be redeveloped. The site is being turned into a mixture of residential and industrial properties with a focus on limiting its future impact on climate change.

Pros of development

More housing for the residents around Harrow

Gives the local Harrow economy a much-needed boost

The unemployment rate will be reduced

More jobs in a time when it is very hard to get them

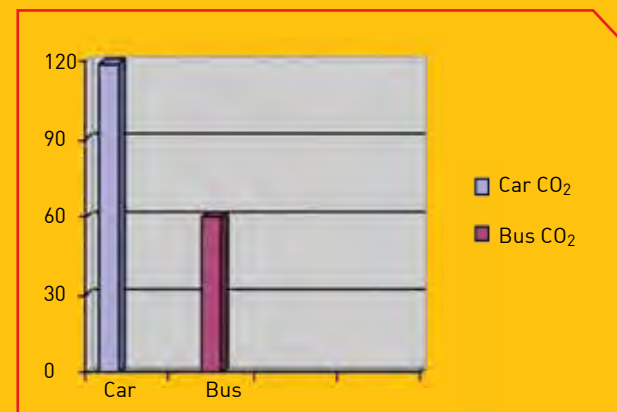
Cons of development

Could cause major congestion around the redevelopment area, leading to more pollution (CO₂)

A possibility of overpopulation leading to major consequences (competition for water resources)

The machinery could emit a lot of CO₂

There would be more demands for resources, putting extra pressure on the local council



The graph shows the amount of CO₂ produced by cars (blue bar) and buses (red bar). The amount of CO₂ produced by the cars is far higher than the buses. So it would be better to get to work by bus rather than car.

Transport in Harrow: the local lowdown on climate change

As you may know TfL (Transport for London) has been changing the buses, making them more fuel efficient and converting them to use hydrogen as fuel. One frequently asked question is whether by using the bus you limit the impact of climate change. If a bus takes 60 cars off the road then you use less fuel per person, reducing the amount of carbon dioxide (CO₂) produced.

This also has quite a big effect on the newly developed Kodak site, which is being converted into flats. The good point about this is that it will not require as many parking spaces if people use the buses, which also means you can have more flats.

Local Harrow resident Frank said, 'I would use the buses more consistently if the service wasn't so inconsistent and if the car wasn't so much easier.'

Energy at the Kodak site

The old factory was powered by its own on-site oil-fuelled power station as it was far cheaper and reliable. However this station was a source of CO₂ emissions, carbon particulates and other industrial pollutants. Mr Whelan commented, 'Harrow was often covered in a thick smog.'

We looked at possible renewable and non-renewable energy solutions to power the new site. Overall there are many choices of power, all of them with advantages and disadvantages, some bigger than others. We think the best way to power the new Kodak site would be a combination of power sources, not relying on only one.

We would use non-renewable and renewable sources because the amount of pollution produced would be balanced out by the amount of power. If you use non-renewable you would get a great amount of power but at a cost of seriously harming the environment and making climate change far worse. If you used renewable resources the environment and climate change would be much better, however Kodak's needs wouldn't be satisfied. So the best solution would be to combine non-renewable and renewable resources together. The resources we would use for the Kodak site are solar power with natural gas or coal – in other words a combination of two resources: solar power and a fossil fuel.

Dale-ly changes

Rochdale weather chaos

Carbon dioxide produced from more cars and more factories, due to an increased population, cannot leave our atmosphere because the heat cannot go through the ozone layer.

Greenhouse gases stay at the top of the atmosphere, where they collect. The heat energy is reflected off this layer of gases, making the global atmospheric temperature increase. This also causes the seasons to change and appear earlier in the year. Studies have not yet proved this. However, in Rochdale a number of sensors were placed in the town centre. These sensors would measure differences in temperature from 2010 to 2013. When the sensors were first put in place people were reluctant. Although some were completely open to the idea, it is important to plan for what climate change might bring for the borough.

Researchers from Manchester University are to measure the temperature sensors for the Northwest. Temperature sensors in Rochdale have been placed on the lampposts, so they are higher up and can get a more accurate reading. This will enable the researchers tracking the results to make a better judgment about what is to be done to combat the fluctuations in our seasonal temperatures in and around Rochdale.

Rubbish recycling in the dale

Bin it!

The first recycling bins in Rochdale were the brown bins for garden waste that came out in 2005. They were introduced to try to combat the ever-increasing landfill sites in the area.

Landfill areas

More and more landfill areas are filling up with more waste cans, rubbish, food, etc. We need to reduce the use of landfill sites. Houses can't be built there because the ground is very unstable. Building houses on landfill areas is bad because homes will start sinking and it will be very smelly from the methane gas. So we need to start recycling more.

My views on the recycling plant at Heywood closing down are that the Heywood tip was always used by the local people. The former users of the tip now have to travel to a recycling plant in Rochdale or Bury. One ex-employee said Rochdale council closed it because of the expense of running the well-used but small tip. This backs up what the people who live in the surrounding areas say. This land is not suitable to be reused for houses, flats or shops as they would fail to stand.

Breezy dale

Wind farms are very useful to our community. The Scout Moor Wind Farm, the only wind farm in Rochdale, has made a massive impact on the energy and electricity provided to the homes in the area.

In the future it is possible that Scout Moor Wind Farm will generate enough electricity to supply the whole of Rochdale. If expansion plans are given the go-ahead, it will supply enough energy for 80,000 homes.

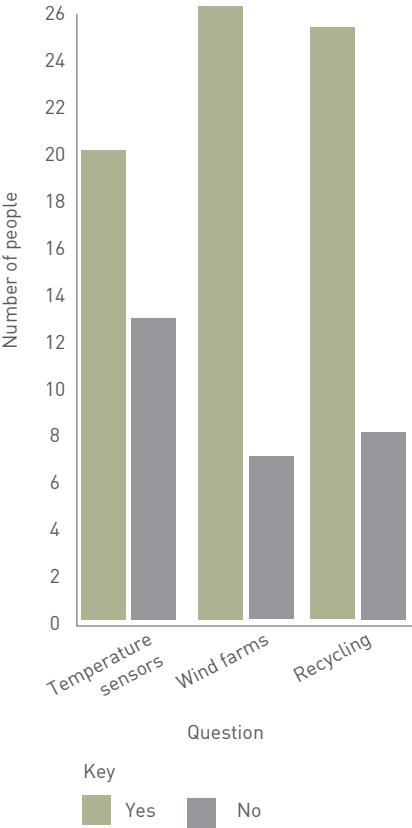
A disadvantage of wind farms is that they cover a large area of land. Wind power consumes no fuel and emits no oil pollution, unlike fossil fuel sources. The energy needed to build a wind power plant is equal to the new energy produced within a few months. There are plans to expand the wind farm in Rochdale in the future. This will make a big difference to Rochdale, its community and the surrounding area. There are going to be 26 more turbines, which will cost around £70 million. If these expansion plans happen, it will be one of the biggest wind farms in England. The turbines will be taller than the CIS tower in Manchester, which is about 200 feet tall. Scout Moor Wind Farm can generate up to 65 megawatts of electricity in total, providing 154,000 megawatt hours per year. The site is on open moorland between Edenfield, Rawtenstall and Rochdale, and is split between the metropolitan borough of Rochdale in north Greater Manchester and the borough of Rossendale in southeast Lancashire. The turbines are visible from as far away as south Manchester, 15–20 miles (24–32 km) away.

What the locals thought

Twenty people out of 33 thought it would be a good idea to use temperature sensors on lampposts as a way of keeping records. On the other hand 13 people did not have the same view, with the main reason being it is a waste of public money.

The use of more wind turbines on Scout Moor was popular, with 26 people voting yes. Most agreed on the reason that they are a good source of renewable or green energy. However, seven people thought it is not such a good idea because it would ruin the countryside views.

Should the council make it easier to recycle? Twenty-five people thought that they should. Many of them thought it would make the environment better, and the council should put more recycle bins in built-up areas such as shopping centres. Eight people voted no. Three thought there are plenty of facilities already. Also, it should be up to each household to do their bit towards recycling.



Local community DRIVING US CRAZY!

Most people like flash, fast cars – maybe a Lamborghini? Probably it is shocking news for all of us that this kind of car produces an average of 166 grams per kilometre (and yes, this is a lot) of the greenhouse gas carbon dioxide (CO₂).

A survey has been conducted in the Lambeth area to find out the following:

- Whether local people have an idea of the amount of CO₂ produced from their vehicles
- Whether they actually care
- If they know about greenhouse gases or just think they're green-coloured gases

Almost most of them didn't understand the harm their cars were doing. Some of them didn't even know what greenhouse gases are. After the survey

a test was also conducted to increase awareness and gather evidence about the dark gas (CO₂) people are producing in their environment. Different vehicles were tested in a local community in Lambeth and results were drawn out in a local school.

It was revealed that some new cars produced significant amounts of carbon particles only because they were not serviced regularly.

People also don't bother to walk, even when they have to cover a distance less than a kilometre. People who work in offices, or go to school or college, often live no more than a ten-minute walk away, but they prefer to produce dark gases from their vehicles. Some old cars and other old vehicles were also found to

be producing large amounts of CO₂. In this regard the MOT process for different vehicles can be challenged, because the survey showed huge amounts of pollutant gases from different vehicles. How come they are on the road? How come they have passed their MOT?

Some interviews with local people showed there was very little awareness of greenhouse gases. Moreover they don't even know they are emitting these gases from their exhaust.

It would be sensible for people to start using public transport, walking to nearby places, cycling and using quality fuels for their vehicles. Regular maintenance can also play a significant role in reducing greenhouse gas emissions from vehicles.

'The way fossil fuels cause global warming is when you burn them, such as oil in the form of gasoline and diesel fuel for transportation energy. They release that carbon back into the atmosphere in the form of carbon dioxide, which is a global warming gas, a greenhouse gas – because CO₂ from these products acts like a blanket over the Earth's atmosphere and traps more heat in the atmosphere than the required one.'

Terry Temminen, author and environmental policy adviser



Bio-massive matters

Peel Energy have proposed a new biomass-fuelled energy plant using mostly wood that would provide electricity for 37,000 homes. But there are two sides to every story... Are there more facts the public should be aware of? We asked many questions to Peel Energy and the Breathe Clean Air Group (BCAG) to find out. Our own Mr B I Omass gives good advice as usual.

Quiz

1. What is biomass?

- Animal waste
- Plants
- Animals
- Coal

2. What group of power source do coal, oil and gas belong to?

- Fossil fuels
- Nuclear
- Biomass
- Wind turbines

3. Are fossil fuels...?

- Renewable
- Non-renewable
- Imaginary
- None of the above

4. Which of the following is non-renewable?

- Wind power
- Solar energy
- Wave energy
- Coal

5. What does BCAG stand for?

- Bill Cares About Goats
- Breathe Clean Air Group
- Biomass Can Annoy Grannies
- British Council Against Green-energy

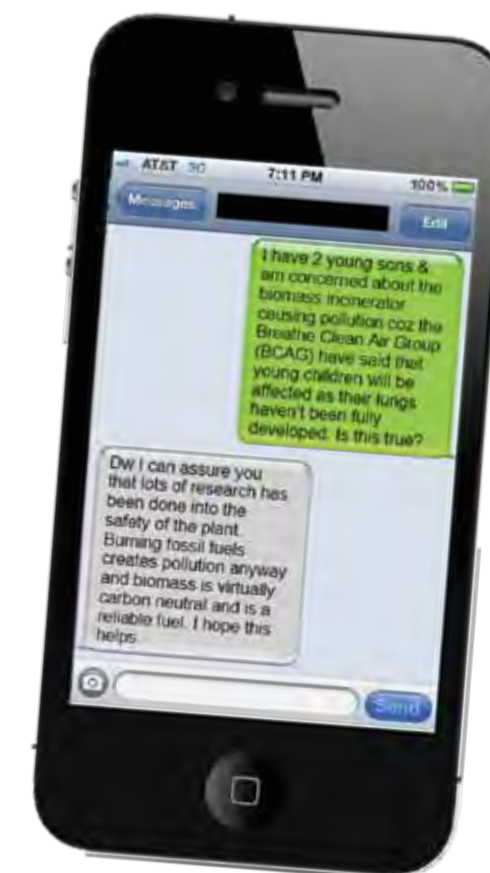
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ESPPEEOPELCLL
SERLSCYTUVPEN

Climate	Pollution	Biomass
Fossil fuels	Trees	Plants
Coal	Oil	Gas
Waste	Factory	Power plant
Environment	Eco	Nuclear
Wind	Sustainable	Atmosphere
Planet	Science	

Quiz answers:
1:a 2:a 3:b 4:d 5:b



Questions for Mr B I Omass



Mason Corbishley of BCAG says...

- Research has shown this type of biomass energy plant could create a high risk of serious health problems including asthma, lung disease and risks of heart attacks.
- The plant would have a low stack (chimney), which means more pollutants in air near the plant and in the local community.
- An increase in pollutants would particularly affect sportspeople, young children and unborn babies.
- The plant is going to use old technology and methods, when better alternatives are out there.
- There are other ways to use biomass fuel that wouldn't pose such a health risk.

Jonathan England of Peel Energy says...

- The biomass plant is not near local homes.
- It will bring employment opportunities to the local community for the next 25-40 years.
- It will provide renewable energy for over 30,000 homes.
- It supports UK and local carbon reduction commitments.
- It will create an ecological area that will support diverse local wildlife.

Our home town of Widnes is located in Cheshire in the northwest of England. On a daily basis we 'see' how our thirst for energy can affect our environment and our lives. We 'see' it as we have our own coal-burning power station which can be seen across the town and the whole region. Within our town there is a mixture of people who feel positively and negatively about having this power station on our doorstep. In this article we will look at how Fiddlers Ferry Power Station affects our town and what they are doing to reduce the impact on our environment locally and, of course, internationally.

Climate change affects everyone

Global warming is an issue which affects nature and causes abnormal weather. It is caused by chemicals and gases such as carbon dioxide (CO₂), nitrous oxide and methane. The most harmful gas is methane, although the amount of CO₂ is the most worrying aspect. CO₂ makes up 72% of all the greenhouse gases. These gases are released into the atmosphere and create a layer, which causes radiation from the Sun to be reflected back to the Earth's surface, making the temperature rise. This effect is caused by human activity.

One effect of global warming is temperature rise. As a result of this, ice will melt and sea levels will rise. This will have a great impact on places close to the sea, as they could end up under water! Widnes is located on the banks of the River Mersey. This means the potential for localised flooding in the future could increase.

Local people have a mixed opinion of Fiddlers Ferry Power Station. We have interviewed citizens of Widnes and asked this main question:

What impact do you think Fiddlers Ferry has on Widnes?

It was no surprise that many people think that the power station is having a negative effect on the environment both locally and internationally. People do however seem aware of what is being done to try to reduce the impact Fiddlers Ferry is having on the environment. Local people also seem really aware of the positive impacts industry on this scale can bring to an area.

Stephen Bray, a civil servant, said, 'Coal is very polluting and we need to find alternatives quickly, before we do lasting damage to our planet.' This echoes the opinion of many locals we spoke to. This is not surprising given the increased global awareness of climate change and its root causes.

Elaine McDowell, a clinical services manager, had a more balanced opinion. She said, 'Looking at all the pros and cons, it has a more positive effect on the town as it gives jobs to the local people and provides us with energy. They are also trying very hard to use alternative power sources to help the environment.'

In conclusion, it seems that local people see the benefits of employment opportunities outweighing any potential environmental damage caused. We definitely collected more positive views about the power station's impact on the local community.

Whilst on a visit to Fiddlers Ferry we were given a leaflet produced by SSE (formerly Scottish and Southern Energy). The leaflet gave us an insight into the hopes and aims of the company. It says that they are trying their best to be more environmentally friendly. They have a strong commitment to maintain the highest possible standards of

environmental management. It goes on to say that SSE is the UK's leading user of recycled biomass fuel (solid biomass fuel such as wood, olive residue, etc.). They already operate one of the UK's largest wind farms and hope to increase the energy taken from wind in the future.

We are delighted with the commitment being shown to find ways to create energy in a more environmentally friendly way. Hopefully, in the future SSE will increase their use of renewable energy sources such as biofuels (solid) to fuel the plant. Hopefully, they will also be able to decarbonise energy production as much as possible. We also hope that they will continue to increase the number of wind farms and hydroelectricity generators they use around the country.

Reducing impact

Fiddlers Ferry Power Station is a coal power plant located in Cheshire. The station has been trying to reduce its impact on climate change for a while now. Fiddlers Ferry aims to produce energy for its customers as efficiently as possible, whilst being at the forefront of environmental thinking.

They have accomplished this in numerous ways. The plant is still reliant on burning coal, but has been making great progress in experimenting with making energy from solid biomass fuels, a carbon-neutral energy source. The types of biofuel being experimented with are olive and wood pellets, as well as oat husks, which are all completely eco-friendly. Currently, 20% of the energy made at Fiddlers Ferry is made using biofuels, which makes it the largest biofuel power plant in England.

Also, the station consumes 195 million litres of water daily from the River Mersey. This water is cleaned before being returned to the river. This has had an impact on improving the water quality for the whole of the Mersey drainage basin. The Fiddlers Ferry site has been officially designated as a site of Importance for Nature Conservation (SINC). Four species of birds – the teal, widgeon, pintail and dunlin – now inhabit the site all year round.

At Fiddlers Ferry they are also working hard to try to recycle and reuse the waste products left over from making electricity. For example, fine ash left over from the combustion process is turned into ash cement tiles for use in the construction industry.

We feel that Fiddlers Ferry is trying to reduce its overall impact on the environment both locally and globally. It will be interesting to see what changes the plant makes in the future.

On Our doorstep . . .

Barclays bikes

In 2010 the Barclays bikes were introduced to the London public, by the Mayor of London. But the question is still circulating: do the 5000 bikes around London actually fulfil the purpose to help reduce emissions?

Global warming is the rising average temperature of the Earth. This is caused by extra greenhouse gases such as carbon dioxide (CO₂) being released into the atmosphere. The CO₂ in the atmosphere traps in heat and thereby increases the temperature of the Earth. This increased CO₂ is caused mainly by human activities, including burning of fossil fuels (such as petrol). The CO₂ released from the burning of fossil fuels is known as carbon emissions.

It is important that the level of carbon emissions by human activity is reduced. This is because of the negative effects of global warming such as melting icecaps, higher temperatures and changes in habitats. One way London has tried to reduce its emissions is by introducing the Barclays bikes in 2010. The purpose of these bikes is to reduce the number of people using their cars to get around London, therefore reducing CO₂ emissions into the air. The bikes offer an alternative to public transport and cars, as well as providing exercise. Around central London there are more than 300 docking stations, supplying 5000 bikes. This sounds like a great idea, right?

Perhaps not. The *Guardian* newspaper printed an article questioning the real benefit of the Barclays bikes. It turns out that the bikes aren't emissions free. Bikes are driven from docking station to docking station to ensure that all stations have available bikes or spots to return bikes. Driving them to different points around London, reduces the benefit of people using Barclays bikes as an alternative to driving.

Two Londoners have voiced their opinions:

'The bikes are good for London because they make people want to cycle more often, which helps the environment by not giving out pollution. Also, it creates a good outlook to the tourists that come into the country.'

Elliot

'The bikes do nothing. They cost to use and by moving the bikes to more convenient places it defeats the whole purpose. They put as much CO₂ into the atmosphere as riding bikes would prevent, if not more. People should just use their own bikes.' Sally

In conclusion, the Barclays bikes, in terms of reducing global warming, may not be reaching their full potential and some alternative solutions to bike transport are necessary. They are also doing good things in others ways. People are doing exercise instead of sitting in their cars and they may encourage more tourists to visit more of London.

FRODSHAM'S FATE

£80 million worth of development, 30,000 homes, 25 years of renewable energy, 19 turbines and just one wind farm. Surely, Frodsham folk can't force this development out?

Frodsham is a sleepy market town in northwest Cheshire. However, Peel Energy has proposed an onshore wind farm consisting of 19 turbines to be built on the nearby marshes overlooking the River Mersey. This could change Frodsham's title from sleepy to eco-friendly.

Peel's proposal will provide enough energy to power 30,000 homes, but are these 30,000 homes against economic development? Luckily for the opposition, the turbines only have consent for 25 years of life, meaning they are temporary and will be removed, therefore restoring the land's former beauty.

Power will be provided all over the country, thanks to the National Grid, so is Frodsham being selfish by opposing the idea? According to government figures, the cost of energy will increase during the long term (if we continue to rely on existing energy resources), therefore projects like this could significantly reduce our energy bills.

Many people worry that building the turbines will lead to closure of the nearby Rock Savage and Fiddlers Ferry power stations, but these accusations are not true. Local industry and people's jobs will not be affected by the turbines. In fact, the only problem facing power stations like these is that over the next decade many of them will close down due to age or lack of demand for non-renewable energy sources. It is therefore unlikely that the onshore wind farm in Frodsham will affect any other power-generating facilities in the area.

The project is estimated to take around 18 months to build and a further 18 months to start producing electricity for all of the country to appreciate. Unfortunately, there isn't a lot of public support surrounding the idea and the ones that do support it don't make as much of a vocal appeal as the protestors! Luckily though, one support group did form, and a number of businesses supported the proposal as they fully understood the economic benefits surrounding the scheme.

This particular wind farm is guaranteed to impact on the community in a great way and was put in place by Community Benefit Funds which support local projects in the communities surrounding the scheme; and the wind farm is no different.

The idea will hopefully start to grow on people. After all, it is their future that Peel are thinking of! With growing pressure from the government, and rightly so, to use more renewable energy sources, everyone is looking for an answer. We believe Peel Energy has come up with a solution to aid in the battle against climate change, but still the people aren't happy! The Northwest has already heavily invested in renewable energy schemes with projects such as tidal energy in Liverpool and biomass here in Runcorn. With public support for this project it would certainly help put the Northwest on the map as being at the forefront of the fight against the climate change catastrophe!

'Public support for the development of onshore wind farms is limited and historically not as vocal as the protestors objecting to such schemes.'

Expert

'I don't think the proposed wind farm is economically viable and I have concerns over the migration birds from our area.'

S Easton

The Blacon Climate Project

The Blacon community has been changing very quickly in recent years. It has become a place of development and improvement. There are better, more frequent bus services, waste and recycling waste pick-ups, and better cycle paths which are part of the national cycle route. Everyone in Blacon is being encouraged to change the environment and help to change the climate for the future, from primary schoolchildren, through us at Blacon High School, to our parents and carers and other adults in the community.

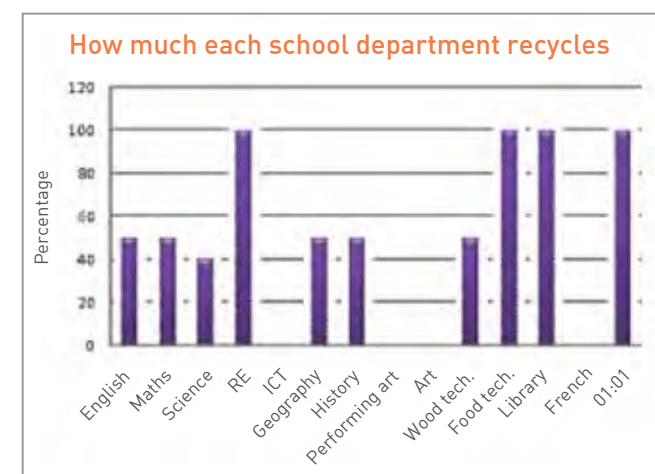
How can we improve?

- More bins in classrooms for recycling paper
- Teachers want to know more about where the school's main recycling bins are

As a school we recycle a lot of paper and ink cartridges. We could definitely try and get the whole school to at least recycle more than we already do. What is a concern is that art and performing arts don't recycle, and these are the departments that use a lot of paper.

From our interview with Dan we now know that the school recycles computer parts and computers. The school also sends parts and full computers to developing countries, so this means we don't just recycle we also help other people. Dan told us that they recycle all the time when they are done with the ink cartridges. The school also has three bins in the ICT Department which are all recycle bins.

The school currently has a green paper recycle bin on site and bins for cardboard as well. We had a chat with Ken Bates, our head grounds officer, to discuss what else the school recycles.



Interview with the caretaker, Ken...

Shannon: Do we recycle?

Ken: We don't recycle a lot, but we recycle paper.

Shannon: Do we recycle anything else?

Ken: We send off computer and electrical items to less developed countries so they can use computers. Unfortunately we don't recycle plastic.

Shannon: What bins do we have to recycle?

Ken: We have several bins. For example, the bistro has a green bin and in the bin store cupboard we have 10 large paper recycling bins and 18 yellow bins for normal waste. We also have a grey paper and card recycling bin.

Shannon: Do a lot of students know about tube recycling bins?

Ken: I don't think that a lot of students know about it, but it could be that recycling isn't encouraged in the classroom.

Shannon: When is the bin emptied?

Ken: The bins are emptied once a month.

Shannon: Light bulbs are recyclable, so do we recycle them?

Ken: We don't currently recycle light bulbs, but on a positive note we are discussing this with Mrs Yates [head teacher] to start.

Shannon: How are we planning on recycling them?

Ken: Well, you can buy a case that holds 300 light bulbs at a time. It costs about £50.



School garden

Blacon High School has a school garden. It was set up two years ago to encourage pupils to take a more active interest in biological sciences. Since then it has been used by pupils throughout the school, especially in the GCSE years, when some pupils study a land-based science course. Vegetables and other plants are grown in the garden and sold to staff for a small fee that goes back into the garden fund. It has encouraged some pupils to consider starting their own vegetable plot at home and getting their parents and carers on board with the idea too. Not all classes use the garden, and it is a good resource that could be used better. In our survey of Year 9 pupils they all knew where the garden is, but only 40% had been out there for a lesson. Further work is being considered for the garden, including setting up a wormery and composter unit. This will allow the school to put unwanted foodstuffs into the compost to go back into the school garden.

Schools

Blacon High School and primary schools in the community have been working with the Sustainable Blacon project to educate residents on the estate about the problems of climate change. The Arches Community Primary School has got on board by having solar panels fitted to the school to save on electrical energy. Other school have their own vegetable gardens like Blacon High and also chickens, which the students at the school care for. Sustainable Blacon has also set up two eco-houses on the estate and local schools and groups work with the staff here. Schools are also recycling more paper and cardboard to help the environment too. They encourage pupils to walk or ride their bikes to school and educate them on climate change. This will help the local environment in the future, because as grown-ups they will know how to reduce waste and save on energy.

Eco-house

The eco-house on Stamford Road is one of two in Blacon, the other on Dyserth Road, built in 2010. The people who work at the eco-house feel like it is their own home. To them it makes what we can do in our homes real. Inside the eco-house each room is dedicated to a particular aspect of daily life:

- Kitchen – reducing waste
- Insulation
- Living room – lights

They highlight the obvious ways to save energy that are missed, for example closing the curtains to save heat. Your radiator can have a dial on that has a range of five settings, and if you aren't in a room and it's empty you can turn it down to one, so it can heat it gently. Turn it up to five if it's really cold and then just change it according to the warmth of the room.

In the back garden of the eco-house there are green, blue and household recycling bins. There is also a wormery which makes a natural compost and a compost bin.

The eco-house concentrates on getting a number of houses in Blacon to become more eco-friendly and helping them to save money, with posters around the house telling you which appliances use the most electricity or gas. We asked them several questions on how we can reduce the amount of gas and electricity we use and also how to reduce the amount of water. They also said that you can influence others that you live with or your neighbours. They also mentioned a website that you can use to help save wasted food from your dinner that you didn't use: www.lovefoodhatewaste.com/cheshire

The eco-house had got a dozen houses to take part in a low-carbon community challenge, part of the Sustainable Blacon project. Schools now also take part, for example Dee Point Primary School, Blacon High School and other schools, which now have chickens to help them reduce their carbon footprint. Labour leader Ed Miliband, who was Secretary of State for Energy and Climate Change in the last government, visited Blacon's eco-house and praised it for its achievements. They suggested how you could reduce the amount of electricity lost in your heating by getting thicker insulation and cavity wall insulation.

How green is Kettlethorpe High School?

As a team of reporters we thought what better place to start finding out about climate change but in our own school? So we split into teams and set off to track down the different aspects of climate change in our school...

We asked our head teacher, Mr Griffiths, for his thoughts...

When asked if he thinks it is the school's responsibility to teach about climate change his response was, 'Yes, including many other things too. People must have a good understanding of the impact climate change is having in their lifestyles – both short term and long term.'

He went on to explain that 'Wakefield is an old coal-mining area, so throughout school we have three coal-fed boilers. These boilers run through the night heating the school when there is no-one in, but age is affecting their effectiveness. The coal to power the boilers is imported from China and the impurities in the coal damage the boiler. We want to replace them with gas in the next few years, but it would cost £500,000 to £700,000 to replace them. We yearly spend £70,000 to £80,000 on gas and electricity.'

He spoke to the caretaker for us to find out about insulation in school. He had the following to say about insulation in our school: 'The new areas in school are insulated to the appropriate standard. We have converted the new science lab to make it more insulated, which cost £70,000 and £9000 for new double-glazed windows.'

We think that recycling is really important for climate

change, so we asked Mr Griffiths if he has any part in recycling in school, and whether he thinks our amount of recycling is sufficient. His response was, 'Paper recycling and sorting bins are monitored every week. Also we could recycle coke cans, plastic bottles, but storage and cleaning is the issue. The caretakers empty bins every day and sort out the rubbish.'

At our school many pupils cycle to school and Mr Griffiths explained why this is becoming more popular: 'We have two bike sheds in school and we have 100+ children. I think we could get more children riding bikes, but there is a big safety issue of commuter traffic. Also, on a morning people are more tired and less observant and that does worry me.'

Solutions for the Planet

Miss Hudson-Frost, a citizenship teacher at our school and the project's coordinator, explained what Solutions for the Planet is all about. 'It's a project where pupils work to create an idea to solve a planetary problem. Some ideas would benefit the world. I like the Free-Energy Regenerators team's idea, which involves using the wasted heat energy from fridges.'

We asked what the other teams' ideas are. 'Another team plan to collect waste plastic bottles and turn them into a greenhouse.'

We asked some of the pupils why they were taking part in the project and they told us, 'So that we can have a more environmentally friendly school.'

Climate change in English lessons

We discussed the topic of climate change in our English lesson, so we asked our English teachers, Miss Gelder and Miss Heslin, for their opinion:

'We know that it is affecting the wider world, but you don't necessarily feel like it affects your personal life on a daily basis. When it is brought to your attention through the media you can worry about it. In terms of school, we do recycle, but in contrast, we use a lot of paper, energy and power.' Miss Gelder and Miss Heslin suggested three things to help the school improve:

- Solar panels
- A rule about switching on and off to save power
- A solution to reduce the amount of photocopying

Climate change in art lessons

We visited the art department and found they were making art from old plastic shopping bags! We asked a couple of pupils about what they are doing and one of them told us, 'We often use recycled materials and discuss the issues of climate change

and how it is everybody's responsibility to make a change.' Another said, 'We used old plastic bags to make new bags by melting a load together and then sewing them up. I think they look pretty cool and it's a good way to make people think about recycling. I think it's called up-cycling.'

Our school and IT

As our school is a specialist maths and computing college we have a lot of computers! So next we decided to ask the IT manager at our school, Mr McLafferty.

He told us, 'In 2010 and 2011 the school spent £63,000 on electricity, which is around 700,000 KWh of electricity.' We were shocked how much we used and so asked him if there is anything we could do to reduce this amount? He suggested, 'We could change our habits, for example switch everything off at the wall. Heating, lights, appliances, photocopiers and printers – all should be switched off when not in use. Pupils and staff need to take responsibility for switching off and also turn off from stand-by!'

Finally we decided it was important to ask some pupils for their opinions!

We asked them all one question... What are your views about climate change?

Darcie Tarff-Leech:
'I know it's bad but there is nothing really to worry about.'

Georgina Lewis:
'It is really bad; we could all die from it someday if we're not careful. People should stop being so selfish and start recycling.'

Georgie Green:
'I think that climate change is exaggerated in the news. The poor polar bears could die though. If the globe was warming we would be able to feel it.'

Lauren Birch:
'People need to come up with new ideas on recycling, like we could get a massive vacuum cleaner so it would suck up the greenhouse gases.'

James Fleming:
'I think it is a load of rubbish as nothing has happened yet. I don't believe in it.'



The London Olympics: a climate challenge

What measures are being taken by the Olympic committee to reduce carbon emissions?

Many projects have taken place to reduce carbon emissions during the Olympics. The Olympic committee have made an investment to boost cycling, they have encouraged the uptake of electric vehicles and an increase in the number of hybrid buses in London's bus fleet. In addition, the Olympic committee have decided to transport 50% of building materials by water or by rail. Furthermore, they have been using ultra-low-sulphur diesel for site vehicles.

The Olympic committee have put in a speed limit of 15 mph because driving slower reduces the carbon dioxide (CO₂) pollution from vehicles considerably. Also, the fact that ticket holders for London events receive a free travel card will lower the amount of emissions released by private cars.

Ticketed spectators and the workforce will travel to and from venues by public transport (except for disabled people who cannot use public transport). The organisers have also teamed up with fuel partner BP and BMW to seek low-emission solutions for games-time vehicle operations.

The London Organising Committee of the Olympic and Paralympic Games has joined forces with Coca-Cola to provide drinks for the games. Coca-Cola vehicles are using biogas to reduce carbon emissions and the vehicles have a carbon footprint half that of normal diesel trucks. Low-emission vehicles will also be used by the Olympic torch relay.

Britain could be fined up to £175 million by the International Olympic Committee (IOC) if it continues to break air pollution laws by the time the games begin in July 2012. To meet the legally binding agreement, London may have to reduce traffic levels by more than 30% over a period of nearly a month. The IOC can withhold 25% of the expected £700 million of Olympic broadcasting income should air quality levels exceed EU limits during the games.

According to the Olympic Delivery Authority's Strategic Environmental Assessment, the expected increases in traffic along the Olympic route network of 600 km of London roads during the games will lead to further breaches of European legal limits in areas that already suffer from poor air quality. Even a 30% reduction in normal traffic during the period of the Olympics may not be enough to bring emissions below the legal limit, it said. A spokesperson for Transport for London said in an interview with the *Guardian*: 'We have a comprehensive package of long-term measures to tackle the biggest sources of pollution and improve air quality.'

Other measures to reduce emissions include:

- Optimising the amount of hired materials and equipment
- Additional renewable energy sources
- A low-emission vehicle fleet – cars, logistics vehicles, buses, etc.
- Green travel plans for ticketed spectators and the workforce
- Cycling and walking will be encouraged via the Active Travel Programme
- Low/zero-carbon Olympic and Paralympic flames

The unseen cost of education

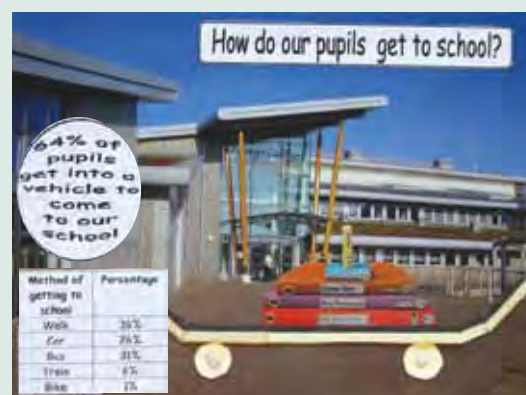
One of the massive benefits of living in Britain is that we are all entitled to a free education. However, as we the pupils of 9L1 found out, there are hidden costs to our education. These might not impact on our wallets and purses directly, but someone ends up paying and in this case it's our environment. This article illustrates how our school impacts on the environment, positively and negatively. Our carbon footprint is affected by burning fossil fuels, using electricity, as well as trees. Anything we can do to reduce our carbon footprint will benefit our Earth.

Hidden costs

Who'd have thought that the food we eat could cause pollution? No, we don't mean like that! We have been investigating where the food in our school canteen is sourced. Through interviewing the canteen manager we found that, although all the meat and dairy products are produced in Britain, most of the fruit and veg are in fact imported from abroad. The further the food travels, the more 'air miles' it has, increasing its carbon footprint. After finding this out, we have begun campaigning through our Eco Schools programme to source more of our food products locally.

Tricky transport

The infographic illustrates the variety of ways pupils travel to and from school. This is always tricky for rural areas, although 74% of us are trying to do our bit.

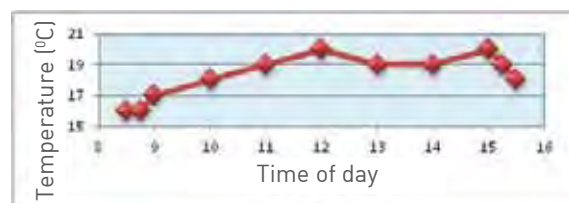


Playing our part

Penryn College is a Cardigan School. This means that the thermostat that controls the school's temperature is set a little lower to 19 °C, which encourages the students to wear jumpers. This may well sound a little Dickensian, but the process saves a lot of energy. Our carbon footprint is deliberately reduced by not using as much electricity to heat the school.

From our interview, we also found out that because there are over 1150 people in the school during a typical day, this has a positive effect on the temperature, effectively heating the school. We chose to investigate this phenomenon for ourselves (see graph).

As part of our drive to reduce carbon emissions, our school has set up a number of solar panels to provide electricity direct to the school. The ethos behind this was that any contribution this green resource could provide would help to lower both our costs and more importantly our carbon footprint. In the first month (January 2011) they saved us £90 as they generated 1000 kW for us. This may seem a small amount, but even if this is typical of an average month, when extrapolated over the year it's still over £1000 which we don't have to spend on electricity but can use for resources for the school.



Our school spends an impressive £10,000 on paper a year. One morning we managed to collect 1754 pieces of wasted paper that had accumulated by photocopiers and in other random places. That's £118.08 seemingly wasted! Whilst paper plays a vital role in learning, we have to be careful not to be wasteful, as trees have a crucial role to play in reducing the amount of carbon dioxide in the atmosphere. To help reinforce this point we have made an enormous paper tree from the wasted paper. However, our school is also very good at recycling. In one week we managed to collect 17 bin bags full of paper to be recycled.

In order to reduce these costs we are following Lao-Tzu:

'The longest journey begins with a single step.'



Leading the way

Here at Penryn College we are lucky enough to have a special area of land that has been converted into an ecology area, farm and garden. Oh well, it's just a farm, you may be thinking, yet it's more than just somewhere to grow your veg. This is a place of learning; it raises awareness of the environment and sustainability. The farm's workshops and events educate people on how to grow their own vegetables and plants and open their eyes to how their actions can either have a negative or positive effect on the environment.

According to Mr Latham, the school's sustainability coordinator, the farm itself contains 'two polytunnels, about 15 raised beds, a pond area, a willow plantation, rabbits, chickens, an animal enclosure, a Cornish apple orchard, various test beds and educational resources'.

The aim of the ecology area was not only to increase natural biodiversity in the school grounds, but also to incorporate the natural world into the learning environment, creating a wild habitat that young people of all abilities can relate to and interact with during the lessons and workshops that take place there. The area shows a miniature version of the global carbon cycle, demonstrating to students all the natural processes. It is this learning that builds people's awareness of the natural world and therefore brings people to care and appreciate their environment. It is this care that spurs positive change.





Project partners

Science Museum, National Railway Museum, Museum of Science & Industry, At-Bristol, Catalyst Science Discovery Centre

The Science Museum would like to thank all the students and teachers at the following schools that took part in this phase of the Climate Science Outreach Project:

London

- Bishop Thomas Grant Catholic Secondary School
- Charles Edward Brooke C of E Girls’ School
- The Charter School
- Conisborough College
- Fulham Cross Girls’ School
- Gunnersbury Catholic School
- Mulberry School for Girls
- Phoenix High School
- Sacred Heart Catholic School
- Salvatorian College
- The Urswick School
- Walworth Academy

Greater Manchester

- Beech House School
- Harrytown Catholic High School
- Sale Grammar School
- Wellacre Academy

The Northwest

- The Bankfield School
- Blacon High School
- The Catholic High School, Chester
- Hawarden High School
- Neston High School
- Ormiston Bolingbroke Academy
- The Whitby High School

The Southwest

- Bradley Stoke Community School
- The Castle School
- Chosen Hill School
- The City Academy
- Coedcae School
- The Commonweal School
- The Corsham School
- Hardenhuish School
- Hayesfield Girls’ School
- Lakers School
- Marlwood School
- Newent Community School
- Norton Hill School
- Penair School
- Penryn College
- Queen Elizabeth’s Community Technology College
- The Ridgeway School
- St Bernadette Catholic Secondary School
- Westlands School
- Worle Community School

York

- Applefields School
- Archbishop Holgate’s School
- Bedale High School
- Huntington School
- Kettlethorpe High School

The Science Museum would also like to thank the following organisations that have helped to fund the *Climate Changing* programme:

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The world’s population is expected to increase significantly over the coming decades. To support economic growth the world will need a vast amount of extra energy. At Shell we are working hard to find solutions to meet this fast growing demand for more energy in a responsible way while supporting a deeper understanding of climate science.

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- Barclays
- Bayer

EXHIBITIONS:INSTALLATIONS:CONVERSATIONS:ART:PART OF:CLIMATE:CHANGING...EXHIBITIONS:A SERIES OF THOUGHT:CONVERSATIONS:CE:PROVOKING EVENTS:PERFORMANCE:LIVE:PERFORMANCE:LIVE:SCIENCE:ART:TOURS:NEWS

