

Inspire Sustainability Mini-Summits

KS3 Guide

Lesson Plans and Resources for
facilitating climate discussion
and solution-based thinking in
KS3 classrooms.



To reach Net Zero 2030 we need action!

Each year, the climate crisis becomes ever more urgent. Scientists say that we have until 2030 to keep global heating under 1.5C.

The West of England has created a Climate Action Plan to reach net-zero carbon emissions by 2030. Working together with regional councils like Bristol, South Gloucestershire, and Bath & NE Somerset, the aim is to become carbon neutral and climate-resilient by 2030.

The goals are set, but the routes to get there are still in question. That's where these summits come in - we need you to help figure out how we reach these aims.

So what is 'Net-Zero' anyway?

'Net-zero' means that we are no longer adding to the total amount of carbon dioxide in the atmosphere.

It does not mean that we emit no carbon dioxide whatsoever, but that we are not adding to the current total.

This is because there could be ways that we can help to remove carbon dioxide, and therefore balance out the amount we emit.

However, net-zero relies on us vastly reducing our carbon dioxide emissions, and not just bet on there being technology to remove it and bail us out.

Crucially, we also need to go beyond net-zero in order to begin reversing the effects of climate breakdown.

Get ready!

Get up to speed ahead of the Summit with some background viewing on our [YouTube channel](#).

Find out why scientists are saying this is Code Red for Humanity. How will thinking like an engineer help? And where is the money for all these changes going to come from?

Check out page 17 for the big picture, and how you can further play your part!

Glossary

Page 17 of these resources contains a glossary, containing definitions for many of the terms and language used in these worksheets.

If you are still unsure what a word or phrase means, then it's good to ask a friend or even search for it on the internet!



Links to **your learning**

KS3 Curriculums:



KS3 Design and Technology

- Design
 - identify and solve their own design problems and understand how to reformulate problems given to them
 - develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations
 - use a variety of approaches to generate creative ideas and avoid stereotypical responses
 - develop and communicate design ideas
- Evaluate
 - analyse the work of past and present professionals and others to develop and broaden their understanding
 - investigate new and emerging technologies
 - test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups
 - understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists

KS3 Computing

- can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems
- undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals
- understand a range of ways to use technology safely, respectfully, responsibly and securely

KS3 Geography

- human geography relating to: population and urbanisation; international development; economic activity in the primary, secondary, tertiary and quaternary sectors; and the use of natural resources
- physical geography relating to: weather and climate, including the change in climate from the Ice Age to the present
- understand how human and physical processes interact to influence, and change landscapes, environments and the climate; and how human activity relies on effective functioning of natural systems

KS3 Citizenship

- are equipped with the skills to think critically and debate political questions
- the ways in which citizens work together to improve their communities
- the functions and uses of money

KS3 Mathematics

- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally
- use language and properties precisely to analyse numbers, probability and statistics

KS3 Science

- Earth as a source of limited resources and the efficacy of recycling
- the production of carbon dioxide by human activity and the impact on climate
- fuels and energy resources
- scientific knowledge required to understand the uses and implications of science, today and for the future

Lesson Plan

The session summary below describes a 1 hour session, applicable to each of the three sustainability topics.

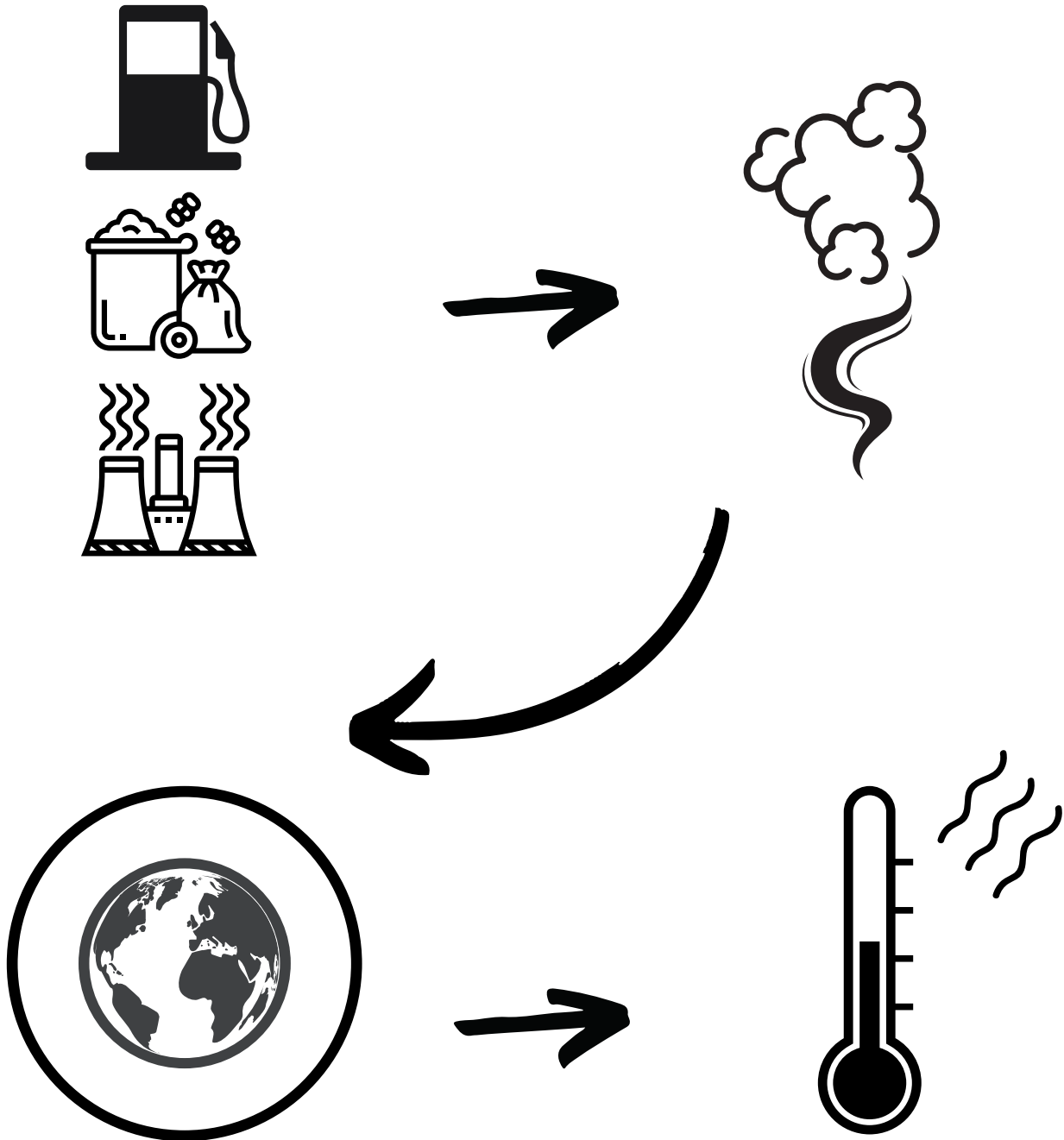
For topic-specific group discussion questions, see the Question Guides for the chosen topic below.

This plan includes a slot for a guest STEM Ambassador to speak, thought this can be removed if required, with more time given to further discussion/debate where needed.

		
Stage	Time	Activity
Set-up	Before session	Plan for student groups of around 4/5. Ensure every group has large flipchart paper or similar, marker pens or similar, and a copy of the 4 page topic booklet found below.
Starter - Net-Zero	5 min 5 of 60	Entry Question is displayed as session begins. What are the symbols representing? What is the story? Lead on to question, 'What is net-zero?'.
Investigate and Empathise	10 min 15 of 60	Investigate the problem by reading the quote from the expert. (Quote Sheet) Students begin their flipchart mind-map, with 'Empathise'. Groups discuss 'Empathise' questions (Question Guide). "To solve the problem, we need to know why the problem exists, and the reasons that people might be resistant to change behaviours." Groups add their responses to the mind-map.
Discuss responses	5 min 20 of 60	Invite groups to share their responses. This is about understanding the problem, and recognising the challenge it poses. Open the conversation up to other groups. Do they have any thoughts to add to other group's responses?
Defining the Challenge - Hear from Expert	5 min 30 of 60	STEM Ambassador gives 5 minute introduction to their role, and outlines the challenge that they face to reach net-zero. Groups are then invited to ask any questions or open a conversation with the ambassador.
Solutions	15 mins 45 of 60	Groups consider existing solutions from real engineers and experts Each group takes a different solution from the three, reads the quote, and considers the discussion questions. Groups add thoughts and responses to their sheet, under 'Testing Solutions' subtitle. The groups then bring their thoughts to the class, and explain the solution to the other groups. Opportunity for the other groups to think of issues with that solution. Open a conversation/debate. To aid engagement, consider asking groups to frame their solution as a series of social-media style hash-tags.
Engineering our Future	15 mins 55 of 60	Groups are now challenged to come up with their own solutions to help reach net-zero in their own contexts. For example: They know their school's strengths/weaknesses with sustainability/climate action. What can they actively bring to the school to impact change? What would they like to see the Head implement? How can policies/habits be improved? Groups add designs/solutions to their sheet under 'Improve'
Feedback and Making an Impact	5 mins 60 of 60	Groups feedback their ideas to the group, and to senior leadership. Ideas are praised, then can be opened to brief conversation about which is the most achievable and of greatest impact in context. Ideas will then be passed on to senior leadership, which then is met with a response and consideration to be later passed on to students. (Students must see that the ideas have been seen and considered by school policy makers. Empowering the students, and potentially having tangible impact that students will feel proud of.)

Starter - The Big Picture

The symbols below represent a problem that needs to be solved. What do you think the story is here?



This relates to the phrase '**Net-Zero**'. What do you think '**Net-Zero**' means? (See Page 1 of this guide for explanation.)

Transport 1 - Group sheet

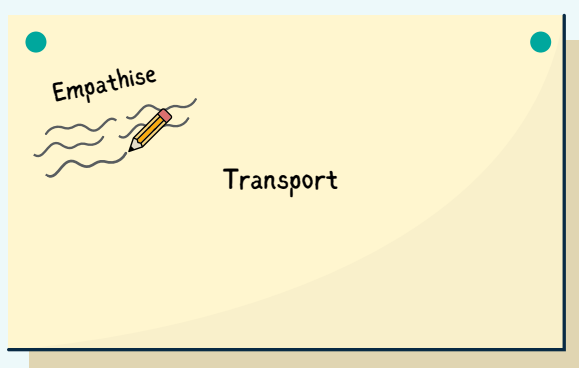


Why do we need to slim down traffic?

Dr Steve Melia from UWE Bristol explains the reasons why we need to reduce traffic by 40% by 2030.



Transport is our biggest emitting sector and unlike the rest of the economy we have made no progress on reducing those emissions. Road traffic has increased by 30% since the 1990s, and is still growing as we drive ever more miles per year. In order to reduce carbon emissions, we have to reduce the amount of traffic on our roads.



Add your 'Empathise' responses to your sheet

Empathise with road users

Why do you think the car has become the dominant form of transport?

Why do most people still use petrol/diesel cars instead of electric?

How do you get to school? If you get a lift, what is preventing you using a greener method?



Our problem is defined as 'How can we take 40% of traffic off our roads by 2030?'



Below are three real experts, that are each suggesting different solutions to this problem. Each group will take a different expert, read their quote (on the Solution & Quote sheet) and discuss the questions below related to that solution.

Each group will write their responses on their sheet, then describe the solution to the other groups. Explaining their agreements/challenges with the solution.



Graham Parkhurst,
Professor of Sustainable Mobility,
UWE Bristol



Lucy Corfield,
Transport Planner



Emilia Melville,
WESTACT

Transport 2 - Solutions & Quotes

Each group should be provided with this sheet, containing the solutions and quotes discussed later during the session.

Each quote relates to an idea that could help in overcoming the challenge with transport.

Each expert has also filmed a video, further explaining their solution, available on our [YouTube channel](#).

1

Autonomous (driver-less) electric buses

Bus services could be improved by going driver-less. The bus would be more regular and can keep to the timetable, by removing the human-error. This in turn, could encourage more people to use the bus rather than drive. - Graham Parkhurst, Professor of Sustainable Mobility, UWE Bristol

“

Whether we look at it from an environmental, social, or economic point of view, the unsustainability problems of transport and mobility are enormous. Simply replacing the UK's 30 million petrol and diesel cars with electric autonomous ones won't be anything like enough to solve these problems, and may even make them worse! That is why it is very important to use our new transport technologies in combination with people changing the way they travel. We need to encourage forms of transport which are space and energy efficient, and used by different groups of people at the same time. Just like the autonomous electric Mi-Link buses in the MultiCAV Project at Didcot.”

”



2

15 minute cities

Plan our cities to make sure that everyone lives within a 15 minute walk or cycle to everything they need, including work opportunities, shopping, leisure facilities etc. Then even ban the use of cars in these areas. - Lucy Corfield, Transport Planner

“

As cities get bigger, we can't depend on everyone travelling into the city centre and jamming up our roads. That's why we need to bring services out to where people live! '15 minute cities' is the idea that everyone can reach their shop, school, or doctors with only a fifteen minute walk or cycle. In my team at Atkins, we're working on projects which will help make it easier for people to travel to their local centres on foot or by bike. ”

”



3

Better-connected Public Transport

Focus on improving public transport, and give people a different option than the car. Make the public transport options affordable, and reliable. If there's a better choice than driving, traffic will be reduced. - Emilia Melville, WESTACT

“

Not everyone can afford or drive a car, and our cities should be organised to support those people. That's why WESTACT aims to connect up the dots with an integrated public transport network. Electric trams will connect up our suburbs, and green buses will take you where you need to go.

”



Transport 3 - Group sheet

Autonomous (driver-less) electric buses

Would you use a bus without a driver? What do you think people's concerns might be? How might you convince somebody to use them?

What other problems would we need to solve in order to switch completely to driver-less electric buses?



Graham Parkhurst, Professor of Sustainable Mobility, UWE Bristol

'15 minute' cities

Do you live a 15 minute walk or cycle away from everything you need to travel to?

What other benefits might a neighbourhood with no cars have?

What challenges might there be to this idea?



Lucy Corfield, Transport Planner

Better-connected Public Transport

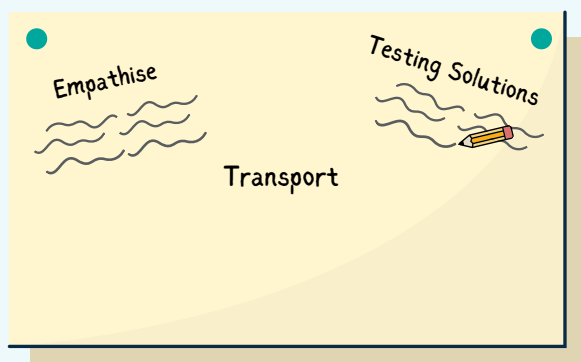
Can you use public transport to get to everywhere you need to go? What are some reasons why people might not use public transport?

Would free bus fares for under 18s encourage you to use the bus?

Do you think the public transport in your area is good? What would you like to see improved?



Emilia Melville, WESTACT



Add your 'Testing solutions' responses to your sheet

Testing Solutions

Add your responses to your group's sheet.

Then, think about how you would describe the solution to the other groups.

Try describing your solution in hash-tags!
#notfarnocar



Transport 4 - Engineering our Future

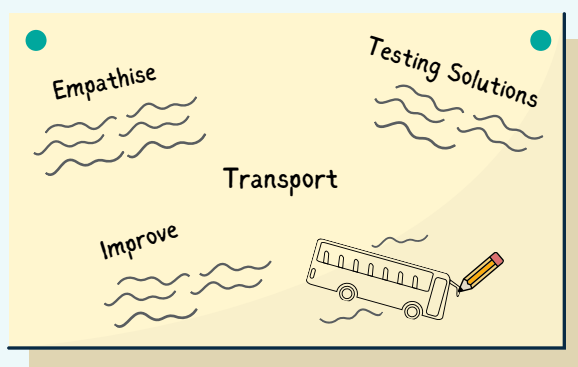


Over to you! You are now challenged to come up with your own solutions to solve the transport problem in your school.

Your ideas will be considered and responded to by the school's senior leadership.

For example:

You know your school's strengths/weaknesses with sustainability/climate action. What changes can you actively bring to the school to make a positive difference when it comes to transport? What would you like to see the Head implement? How can policies/habits be improved?



Add your 'Improve' ideas to your sheet

Improve

Add your ideas/solutions to your group's sheet.

Be prepared to explain why your idea should be considered by the school.

The best ideas from the class will be responded to by the school leadership team.

Waste 1 - Group sheet



Investigate

What does rubbish have to do with the climate?

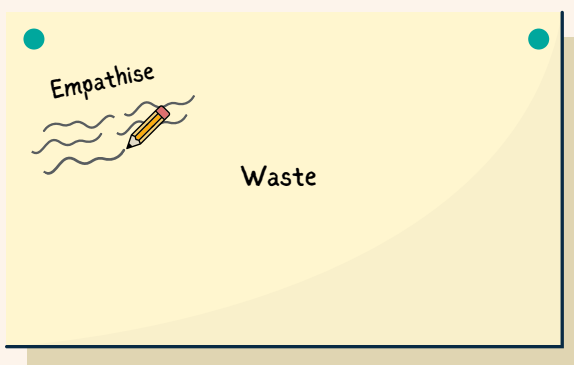
Professor Lorraine Whitmarsh from the Centre for Climate Change and Social Transformations, University of Bath, explains the issue.



Not only are mountains of waste bad for the environment and wildlife, but they're also linked to increased carbon emissions. How? Well the more stuff we make, transport, and then throw away, the more emissions are wasted in the process. In fact, two thirds of the UK's emissions come from the physical stuff we buy. We need to fundamentally rethink our throwaway culture.



Empathise



Add your 'Empathise' responses to your sheet

Empathise with customers

Why do your friends or family throw away so much household rubbish (even if they know about climate change)?

Why do you buy disposable plastics and food containers?

Why do we buy new clothes, and get rid of perfectly usable ones?



Define

Defining our challenge: 'We need to reduce the amount of waste by 65% by 2030'



Test

Below are three experts, that are each suggesting different solutions to this problem. Each group will take a different expert, read their quote (on the Quote sheet) and discuss the questions below.

Each group will write their responses on their sheet, then describe the solution to the other groups.



Jasmine Tribe,
City to Sea



Professor
Teresa Dillon,
UWE Bristol



Olivia Meyonette,
Resource Futures

Waste 2 - Solutions & Quotes

Each group should be provided with this sheet, containing the solutions and quotes discussed later during the session.

Each quote relates to an idea that could help in overcoming the challenge with Waste.

Each expert has also filmed a video, further explaining their solution, available on our [YouTube channel](#).

1

Banning single-use 'disposable' plastic items

Impose a ban on single-use plastic, such as coffee cups, straws and plastic bottles. There are other alternatives to using these that can easily be reused, rather than being thrown away to landfill or to end up in the sea. - Jasmine Tribe, City to Sea

“

We can't swap or substitute our way out of this mess. Fundamentally, we have to stop buying throwaway stuff. I've seen the impact our society has on the natural world, and it's pretty dire. There's bottles, wet wipes and single-use food packaging littered all the way around the British Isles! That's why we're calling for a boycott and a ban – just don't buy that straw, coffee cup, or bottle – choose reusable instead!

”



2

Teaching skills to repair and fix broken items

Focus on making it easier for people to repair broken items, rather than buying new. Open repair-cafes, teach repair skills, make replacement parts easier and cheaper to buy, stop companies making it harder to repair tech instead of just buying the latest model. - Professor Teresa Dillon, UWE Bristol.

“

Repairing our own belongings is an act of rebellion, of refusing to participate in our throwaway society. We need to fall in love with our stuff again – repairing second-hand items, hanging on to clothes that bit longer, artfully patching up objects, or even steampunk salvaging from landfill. These are all lost skills which need to be rediscovered. ”



3

Improve recycling, and only make new things from recycled materials

Improve the way we recycle, and force companies to take recycling more seriously. Do not let companies manufacture new materials when they can use recycled materials instead. - Olivia Meyonette, Resource Futures

“

While reduce and reuse are important parts of the waste triangle, we can't get away from the fact that most of us consume an awful lot on a daily basis. That's where recycling comes in. It's my job to gather evidence, or first hand data to help us redesign collections, policy, packaging and waste systems, so it is easier for people to reduce, reuse and recycle and also to help build the circular economy.

”



Waste 3 - Group Sheet

Banning single-use 'disposable' plastic items

Why doesn't everybody use reusable coffee cups? How easy is it to ban them?

What other 'disposable' items can you think of? Do you think all of them are necessary?

How can you do your bit to reduce the plastic waste your household uses?



Jasmine Tribe, City to Sea

Teaching skills to repair and fix broken items

What was the last thing you repaired, rather than throw away and buy a new one?

Why do you think people don't repair things? How could this be solved?

Do you think companies make it easy to send things back for repair?



Professor Teresa Dillon, UWE Bristol

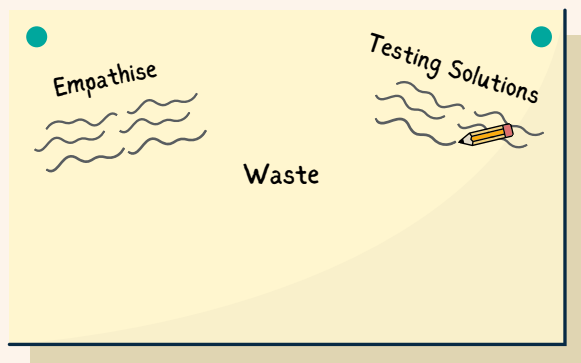
Improve recycling, and only make new things from recycled materials

Do you make sure things in your household get recycled? Do you trust that your waste is getting recycled properly by the waste companies?

Do you think we should ban making new materials, and only reuse what we have already made? Do you think this would work?



Olivia Meyonette, Resource Futures



Add your 'Testing solutions' responses to your sheet

Testing Solutions

Add your responses to your group's sheet.

Then, think about how you would describe the solution to the other groups.

Try describing your solution as hash-tags!
#giveupdisposablecups



Waste 4 - Engineering our Future

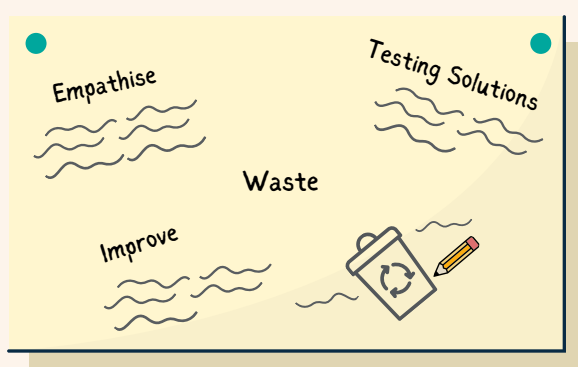


Over to you! You are now challenged to come up with your own solutions to solve the waste problem in your school.

Your ideas will be considered and responded to by the school's senior leadership.

For example:

You know your school's weaknesses with waste food/materials/recycling/litter. What changes can you actively bring to the school to make a positive difference? What would you like to see the Head implement? How can policies/habits be improved?



Add your 'Improve' ideas to your sheet

Improve

Add your ideas/solutions to your group's sheet.

Be prepared to explain why your idea should be considered by the school.

The best ideas from the class will be responded to by the school leadership team.

Energy 1 - Group sheet



Investigate

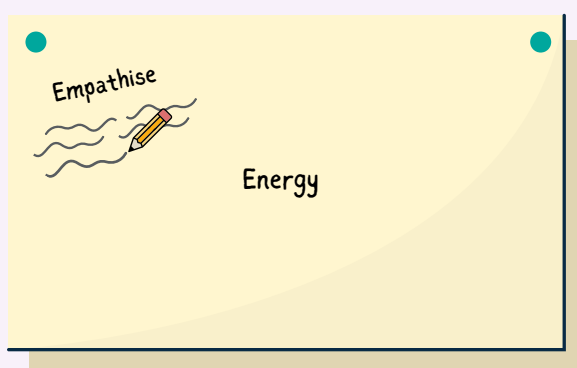
Why can't we keep using gas boilers?

Read the quote here by Associate Professor Ruzanna Chitchyan, Cabot Institute and Department of Computer Science, University of Bristol.

“Today in the UK, 9 out of 10 homes are heated via a gas boiler - they use a fossil fuel gas. Home heating accounts for 14% of our carbon emissions. But the rules are already changing: in Bristol all new homes will have a fossil fuel-free alternative heating by 2025. The next step will be updating old housing, by retro-fitting and replacing our existing home heating with climate friendly alternatives. We need skilled professionals in heating, retrofit, building, energy supply, ICT, management and more to tackle this whole-scale lifestyle change.”



Empathise



Add your 'Empathise' responses to your sheet

Empathise with customers

Why do your friends or family have gas boilers in their homes (even if they know about climate change)?

Why do you think house builders aren't putting in climate friendly technologies right now?



Define

Define the challenge: 'How can we heat our homes without using fossil fuels by 2030?'



Test

Below are four experts, that are suggesting three different solutions to this problem. Each group will take a different solution, read the expert quote (on the Quote sheet) and discuss the questions below.

Each group will write their responses on their sheet, then describe the solution to the other groups.



Darren McClure and Anna Muir,
Atkins



Ian Preston,
Centre for Sustainable Energy



Denis Fernando,
Friends of the Earth

Energy 2 - Solutions & Quotes

Each group should be provided with this sheet, containing the solutions and quotes discussed later during the session.

Each idea could help in overcoming the challenge of heating our homes and energy.

Each expert has also filmed a video, further explaining their solution, available on our [YouTube channel](#).

Focus on renewable energy

1

Replace fossil fuel power stations with renewable energy sources. Invest in wind and solar power that does not emit carbon dioxide. This would require a large initial investment, and would also need to solve energy storage issues for when solar and wind power is not enough. - Anna Muir and Darren McClure, Atkins

“



The UK is a world-leader for wind power, which now accounts for 24% of our electricity energy mix. We have so many solutions at our fingertips for low-carbon energy. We think that designing and rolling-out renewable energy sources is a huge opportunity for the UK economy, and our potential to lead the world in climate action and mitigation. ”



2

Insulating all our homes

Insulating our homes means reducing the amount of energy needed in order to heat them. This requires investment from governments in order to help people afford the work. Also, making sure that all new homes built are insulated properly from the outset. - Ian Preston, Centre for Sustainable Energy

“

Energy demand has fallen over the years, with households consuming 12% less energy than they did in the 1970s. But to reach Net Zero, it has to fall even more. We need to tackle the energy efficiency of our housing stock's fabric – reducing our emissions and making our homes warmer and more comfortable to live in. Our engineers have an opportunity to work on housing ideas to help revolutionise the retrofit industry. ”



3

Focussing on giving people 'green skills'

Moving to a sustainable renewable energy future will require many skilled workers. Young people will have opportunities to train these green skills and enter these careers. The solution is to focus on given young people the skills, opportunities, and confidence to take the chance. - Denis Fernando, Friends of the Earth

“



The energy transition presents a jobs bonanza, and that is only a good thing for young people! As well as exciting technologies being installed in new housing, we also need to retrofit nearly 28 million homes across the UK. Whether it is heat pumps, insulation, engineering design, or electricity generation – that's a lot of skilled workers we need over the next decade. As you enter the workforce, get ready to contribute to our Net Zero transition!”

”

Energy 3 - Group sheet

Focus on renewable energy

Is your school using renewable energy sources - how might we find out?

Would you want to live near a Nuclear Power Station?
What about a coal power station, or a solar farm?

Darren McClure and Anna Muir, Atkins

Insulating all our homes

What can we do to improve energy efficiency in our school?

What challenges will there be to insulating everyone's homes?

What insulation do you have in your home?

Ian Preston, Centre for Sustainable Energy

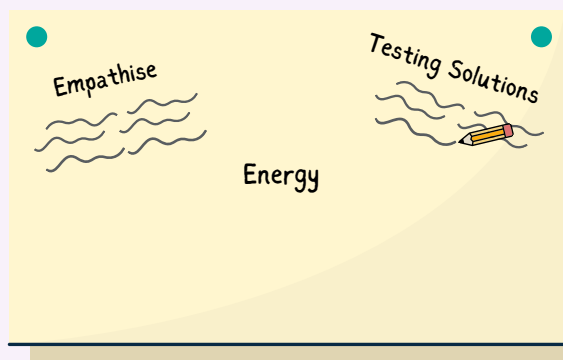
Focussing on giving people 'green skills'

What are your personal strengths? How do you think you could use that skill in the future to help address this challenge?

What sustainable jobs do you think you might be interested in?

When choosing a career, is that career's impact on the planet important in your decision?

Denis Fernando, Friends of the Earth



Add your 'Testing solutions' responses to your sheet

Testing Solutions

Add your responses to your group's sheet.

Then, think about how you would describe the solution to the other groups.

Try describing your solution as hash-tags!
#juststopoil



Energy 4 - Engineering our Future

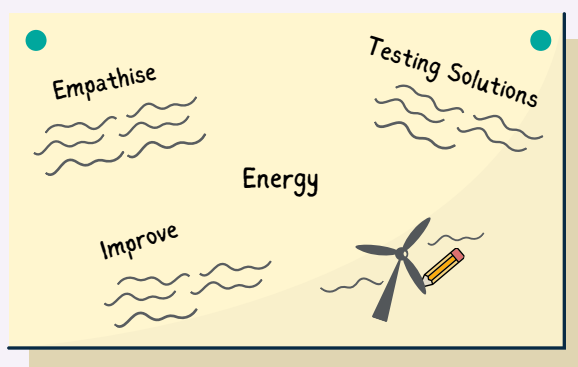


Over to you! You are now challenged to come up with your own solutions to solve the energy/heating problem and reach net-zero in your school.

Your ideas will be considered and responded to by the school's senior leadership.

For example:

You know your school's strengths/weaknesses with energy saving and heating. What changes can you actively bring to the school to make a positive difference? What would you like to see the Head implement? How can policies/habits be improved?



Add your 'Improve' ideas to your sheet

Improve

Add your ideas/solutions to your group's sheet.

Be prepared to explain why your idea should be considered by the school.

The best ideas from the class will be responded to by the school leadership team.

More information

The following page provides some links to more information about the organisations that have contributed to these resources.

Link	Organisation Description
https://www.mi-link.uk/	Mi-Link runs an Autonomous Electric Bus Service operating between Milton Park and Didcot Parkway. The aim of the project is to improve the way people move around the Milton Park and the wider Didcot region in a more sustainable way.
https://westact.org/	West of England Shared Transport and Active Travel Network - an organisation campaigning for improved bus services in the West.
https://friendsoftheearth.uk/	Friends of the Earth is a grassroots environmental campaigning community. From our campaigners and lawyers to local action groups and supporters across the country, we push for change for people and planet. And together we make change happen.
https://www.cse.org.uk/	Centre for Sustainable Energy - CSE supports people and organisations across the UK to tackle the climate emergency and end the suffering caused by cold homes.
https://www.resourcefutures.co.uk/	An independent, non-profit-distributing environmental consultancy working to create a sustainable world.
https://www.citytosea.org.uk/	City to Sea is an environmental organisation on a mission to stop plastic pollution. We run people-powered, community-serving campaigns that help individuals and businesses to change the world whilst having some fun on the way.
https://www.uwe.ac.uk/	University of the West of England - Bristol

The following page provides a glossary of terms used in these resources.

Term	Definition
net-zero (a further explanation of 'net-zero' can be found on page 1)	When the Earth's total carbon dioxide levels in the atmosphere are no longer increasing. This is what we need to achieve as soon as possible in order to stop the climate getting any worse.
sustainability	If something is 'sustainable', then it is able to be continued over a long period of time, without causing damage or an imbalance to the environment.
emissions/ emitting	The production of gases (usually carbon dioxide) into the Earth's atmosphere. This is often due to the burning of fossil fuels.
petrol / diesel	Different types of fuel, used in cars and engines. They are made from fossil fuels.
driverless	New car technology that allows them to drive without having a driver control them.
circular economy	Instead of us making new things, buying them, then throwing them away; the circular economy means trying to re-use existing materials and products as much as possible.
renewable energy	Energy that is collected from a source that does not use up the Earth's resources. Solar and wind are good examples of renewable energy sources.
climate mitigation	This is any action that aims to limit the damage that something has on the climate.
energy efficiency	How good a process is at not wasting energy.
retrofit	Upgrading an old building to have newer features or technology.
energy transition	The process of changing our current energy system, over to a system that does not use fossil fuels.

A better future - how will you play your part?

