

FUTURE TRAVEL

Communication Project
For Teachers **p2&3**, for Students **p4**

HEALTH AND SAFETY

Students should be encouraged to make their own risk assessment before they carry out any activity, including surveys. In all circumstances this must be checked by a competent person. Students using specialised equipment should be supervised at all times.

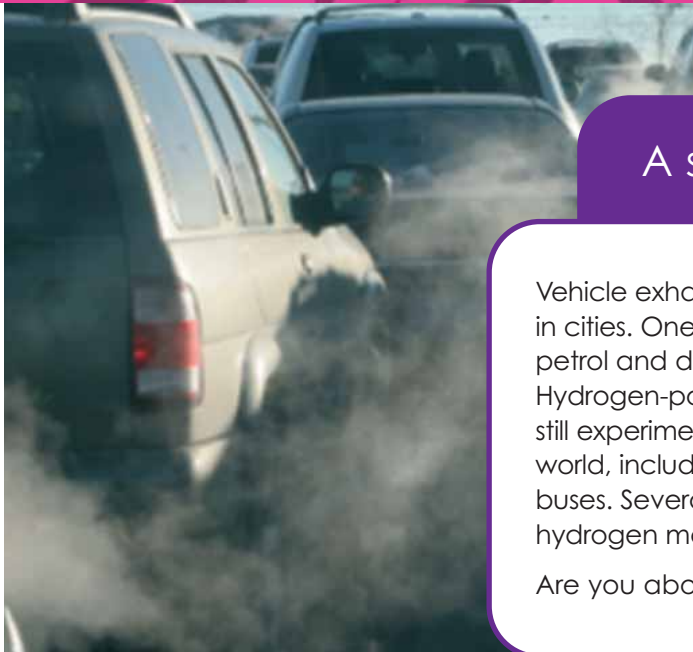
Combustion of fuels requires careful risk assessment and close supervision. Students should plan and carry out their project, but all practical work must be vetted.

The aim of the project is to investigate how CO₂ emissions can be measured. Petrol and other low flash point hydrocarbons must not be used. Alcohols, paraffin, cooking oil and gaseous fuels may be acceptable.

Students may want to set up unorthodox experiments and you may need to seek specialist advice. Organisations such as CLEAPSS and the Royal Society of Chemistry are able to help.

FUTURE TRAVEL:

Silver Communication Project - For Teachers



A solution to pollution?

Vehicle exhaust fumes pose serious pollution problems in cities. One suggestion is to use hydrogen instead of petrol and diesel – but that's not as simple as it sounds. Hydrogen-powered vehicles do exist, but so far they are still experimental. At least twelve cities around the world, including in England, are trying out hydrogen buses. Several car manufacturers are developing hydrogen models.

Are you about to witness a 'green transport' revolution?

HAVE YOU EVER WONDERED?

... how effective you might be as an environmental campaigner?

You might like to imagine yourself in a situation such as...

Some information sources claim that hydrogen is an environmentally-friendly energy source, and should be the transport fuel of the future. Others disagree. As an environmental campaigner, you need to sort out the confusion, so you can decide whether you should campaign for or against hydrogen power. You need to gather information on both sides of the argument, then **use your communication skills** to:

■ come up with a way to convince your target audience that

- hydrogen-powered vehicles are 'greener' than conventional petrol or diesel vehicles

or

- hydrogen-powered vehicles are not as 'green' as environmentalists say they are

■ explain why some people believe that hydrogen-power is 'green', but others are not so sure.

POSSIBLE EQUIPMENT, MATERIALS AND RESOURCES

These will depend on the presentation format(s) chosen by the student. They might include:

- digital camera and access to photo-manipulation software
- video camera and editing facilities
- drama performance area
- an independent audience to whom to present their project
- samples of wetsuits or wetsuit materials, balances for weighing, equipment for showing cooling or heat flow
- facilities for practising practical demonstrations
- access to someone skilled in preparing and delivering presentations
- an audience for a dress rehearsal

Prompts

The **Student Brief** gives some triggers to start students thinking. They should realise that each trigger has various implications. Encourage them to identify these themselves. However, if necessary, prompts such as those below might be given, to point students in suitable directions.

- **The nature of your target audience, and how to make an impact on them**
 - What type of audience could you select to test your communication skills?
 - How strong would your arguments need to be for a sceptical audience such as:
 - 'petrolheads', to convince them that hydrogen power is a good idea, or
 - Green Party members, to persuade them that 'zero emissions' gives a false impression?
- **Using a mixture of written, spoken and visual communication, including experiments, if appropriate**
 - What are the alternatives to conventional presentations, such as PowerPoint? Have you thought about:
 - developing a teaching aid
 - producing a short play
 - role playing - for instance, an election hustings meeting or Question Time type debate
 - producing a video documentary film
 - a balloon debate?
- **How to be entertaining as well as informative**
 - How can you present information and numerical data in interesting ways, rather than as dry facts and figures?
 - Which relevant experiments could you demonstrate?
- **Ensuring that you present scientific information, rather than emotive arguments**
 - What aspects of the science do you need to include?
 - Can you back up your statements with supporting evidence?
- **Using correct scientific language and terminology**
 - If terminology is incorrect, unclear or ambiguous, how will this affect your argument?
 - How can you clearly explain technical terms – matching explanations to the level of the audience?
- **The reliability of your information sources**
 - Where did the data originate?
 - How many sources corroborate the evidence?
 - Does the source have any vested interest?
- **Presenting both sides of the argument; making it clear why you support one side**
 - What are the possible counter-arguments? Can you be ready to counter them?
 - What are likely questions from the audience?
- **The prompts in the Research project may help students when thinking about the scientific content.**

Suggestions for supporting students

Communicators should spend the majority of their time working on how to deliver their message, rather than information seeking.

It is recommended that, wherever possible, Silver Award students should have a scientist or engineer as Mentor for their project. Please contact your CREST Local Coordinator to discuss mentoring.

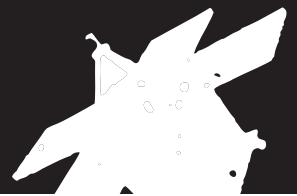
A Mentor with knowledge and/or experience of hydrogen technologies would be ideal. The Mentor might be involved in...

- **academic or industrial research into, for instance:**
 - use of hydrogen for motive power
 - environmental effects of hydrogen manufacture, and usage in vehicles
 - fuel cell development
 - use of photovoltaics (solar cells) for generating hydrogen by electrolysis
- **scientific publishing**
- **a commercial trial of hydrogen-powered vehicles, such as Transport for London's Citaro BZ fuel cell fleet**
- **developing hydrogen-powered cars with a manufacturer**
- **Student should decide their focus, although this may alter in the light of experience as the project progresses.**

Internet search

Combine 'hydrogen' with terms such as: powered, vehicle, car, bus, ICE, fuel cell, generation or production. Or try:

- **London Schools Hydrogen Challenge**
lshc.co.uk/secondary/default.asp
- **How hydrogen fuel cells work**
docbrown.info/page01/ExIndChem/ExtraElectrochem.htm
(Click '5 Fuel cells' in index)
www.schoolscience.co.uk/_db/_documents/tsqg_fuelcells.pdf
auto.howstuffworks.com/fuel-efficiency/alternative-fuels/fuel-cell.htm
- **Making a rudimentary DIY hydrogen fuel cell**
scitoys.com/scitoys/scitoys/echem/fuel_cell/fuel_cell.html
(Alternatively, use carbon electrodes, collecting gases in electrolyte-filled test tubes above them).



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 - hydrogen-powered vehicles are not as 'green' as environmentalists say they are
- explain why some people believe that hydrogen-power is 'green', but others are not so sure.

Some things to think about...

- The nature of your target audience, and how to make an impact on them
- Using a mixture of written, spoken and visual communication, including experiments, if appropriate
- How to be entertaining as well as informative
- Ensuring that you present scientific information, rather than emotive arguments
- Using correct scientific language and terminology
- The reliability of your information sources
- Presenting both sides of the argument; making it clear why you support one side
- Who will advise you about preparation and delivery of your presentation?

Health and Safety

Should you carry out any experiment or practical activity:

- (a) find out if any of the substances, equipment or procedures are hazardous
- (b) assess the risks (think about what could go wrong and how serious it might be)
- (c) decide what you need to do to reduce any risks (such as wearing personal protective equipment, knowing how to deal with emergencies and so on)
- (d) make sure your teacher agrees with your plan and risk assessment

NOTE: Your teacher will check your risk assessment against that of your school. If no risk assessment exists for the activity, your teacher may need to obtain special advice. This may take some time.

- (e) if special tools or machines are needed, arrange to use them in a properly supervised D&T workshop.