



Implementing the Challenge – Teacher guidelines

The London Schools Hydrogen Challenge has been specifically designed to support the Key Stage 3 National Curriculum for Science and Geography.

The Challenge enables students to develop enquiry, research and communication skills and gain knowledge and understanding about becoming informed citizens, which supports objectives within the Information and Communication Technology (ICT), Citizenship and Personal, Social and Health Education (PSHE) curriculum.

The project work can also be used to support key transferable skills in English, Drama and Art and Design, making the Challenge a versatile and useful resource for Key Stage 3 teaching.

Teaching resources

The Challenge provides three types of teaching resources that have been developed to enable students to learn about the issues relating to climate change, the need for renewable energy and how hydrogen can provide a 'clean' source of energy for the future that does not contribute to climate change.

Online interactive lessons

The three interactive lessons allow students to learn about the topics of:

- How we get hydrogen
- Combustion of hydrogen
- Hydrogen fuel cells

The online lessons are designed to be used in the classroom, over a period of one lesson, on an interactive whiteboard or individual PCs.

Online info-activities

Six info-activities allow students to explore the concept of clean energy further using a variety of methods. Online interactive word games, along with design, creative writing and role-play projects can be used for follow-up lessons or for independent learning.

Information sheets

A series of information sheets can be used to help plan lessons or photocopied and given to students to provide extra information on the topics of sustainable development, renewable and non-renewable energy and hydrogen.

In addition, students will have access to supplementary online info-activities and resources from the BMW Education Programme www.bmweducation.co.uk/CleanEnergy. This includes the 3-minute film 'Hydrogen Power' that can be watched online, interactive word games and suggestions for project work.

Resources needed

- Interactive whiteboard (for class or group work)
- PC (for independent work)
- Photocopies of Challenge Pack student information sheets
- Access to internet and/or library resources for further research



LONDON SCHOOLS HYDROGEN CHALLENGE

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Information sheet

Lesson 1: How we get hydrogen

Learning objectives

In lesson 1, students will learn that:

- Hydrogen is a chemical element
- Elements are represented by chemical symbols
- Hydrogen atoms consists of one electron and one proton
- Atoms are joined together by chemical bonds
- Hydrogen often combines with other atoms to form molecules
- Hydrogen can be obtained from a number of different sources
- Different materials have different properties and the process for obtaining hydrogen depends on the type of material
- Electricity is the flow of electrons
- Fossil fuels are a source of energy
- When fossil fuels are burnt they give-off carbon dioxide, which is a greenhouse gas responsible for global warming
- There are many sources of renewable energy
- Renewable energy is needed to prevent further climate change.

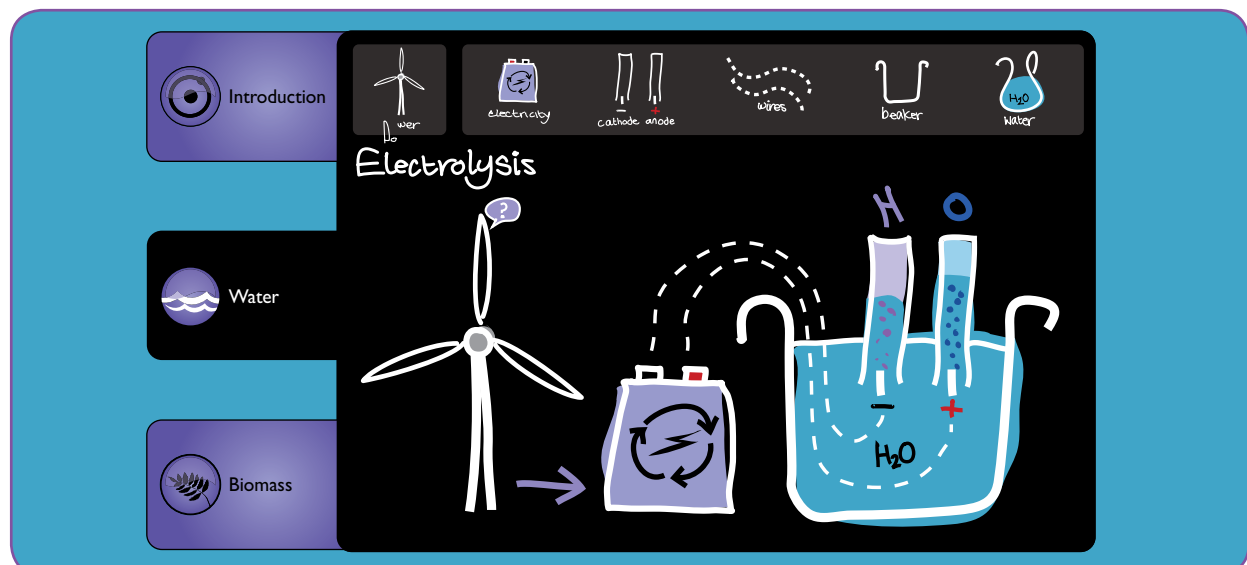
Independent learning activities/homework

The info-activities to support lesson 1 are:

- Online word game
- Newspaper article writing project

Cross curricular connectivity

- English
- PSHE
- Citizenship
- ICT





Lesson 2: Hydrogen fuel cells

Learning objectives

In lesson 2, students will learn that:

- Hydrogen is a source of renewable energy
- Energy can be transferred from hydrogen to create electrical energy
- Hydrogen is an energy carrier, which means it can store energy and transfer it from one place to another
- Hydrogen fuel cells can provide a source of renewable energy which does not contribute to climate change.

Assumed knowledge

- Electricity is the flow of electrons.

Independent learning activities/homework

The info-activities to support lesson 2 are:

- Online word game
- Poster design project

Cross curricular connectivity

- Art and Design
- PSHE
- Citizenship
- ICT

Lesson 3: Combustion of hydrogen

Learning objectives

In lesson 3, students will learn that:

- Hydrogen is a source of renewable energy
- Hydrogen is an energy carrier, which means it can store energy and transfer it from one place to another
- Energy can be transferred from hydrogen to create power for vehicles using the process of combustion
- When hydrogen is burnt in the presence of oxygen heat and water are produced
- Using hydrogen to power vehicles does not create pollution that can lead to climate change.

Independent learning activities/homework

The info-activities to support lesson 3 are:

- Online word game
- News broadcast role-play project

Cross curricular connectivity

- English
- Drama
- PSHE
- Citizenship
- ICT