QER for Schools

QER Science Lesson – Year 9
Minimising environmental impacts

NOTES

A field trip for students to explore for themselves elements of mine site rehabilitation by conducting a site survey, and strategies for the minimisation of greenhouse gas and other emissions, is a great learning opportunity. But for those who can't make it to the QER site in Gladstone, this lesson brings it to your classroom.

In this lesson, students will:

- compare rehabilitated sites with undisturbed, native bushland
- explore methods that are used to reduce greenhouse gas and other emissions at the QER new fuels development centre

LESSON-LEVEL CONTENT DESCRIPTIONS

The Australian Curriculum: Year 9

Use and influence of science: The values and needs of contemporary society can influence the focus of scientific research (ACSHE228).

Elaborations:

- investigating how scientific and technological advances have been applied to minimising pollution from industry
- considering how choices related to the use of fuels are influenced by environmental considerations
- considering safe sound levels for humans and implications in the workplace and leisure activities

Year 9 achievement standard

By the end of Year 9, students use their knowledge to pose different types of questions that can be investigated using a range of inquiry skills. They apply their knowledge of science to explain phenomena in the environment and their own lives and describe how knowledge has developed through the work of scientists. They use scientific language and representations when communicating their results and ideas.

Students use knowledge of interrelationships to describe how changes affect ecosystems. They explain geological features and events in terms of geological processes and timescales. They describe interrelationships between science and technology and give examples of developments in science that have affected society.

LESSON OUTCOMES

The assessment focus of this lesson is formative: The classroom activities provide an opportunity for students to generate evidence with which the teacher can establish the student's progress towards understanding the concepts that are being developed in this lesson.

Science Outcomes	Literacy Outcomes	Numeracy Outcomes
Students may/should be able to:		
• make observations and draw conclusions regarding rehabilitated sites • identify strategies for reducing greenhouse gases and other emissions from mine sites	• listen • read • view • write • speak • discuss scientific phenomena • document scientific phenomena • hypothesise about speculative ideas • use technical terms in a scientific context	• collect data • interpret data • collect qualitative data • analyse data • identify trends and patterns

BACKGROUND INFORMATION

Students should have a prior knowledge of:

- greenhouse gases
- energy efficiency
- forestry as a means of carbon capture

PREPARATION LIST

- reproduce the activity Rehabilitation of an oil shale mine in full colour, or arrange for students to view the document on screen.
- download and reproduce the Oresome Resources Oil Shale Fact Sheet from www.oresomeresources.com/resources_view/resource/fact_sheet_oil_shale or arrange online access for students.
- prepare the video: QER web site www.qervisitorcentre.com.au/ –> QER and sustainability –> Environment –> QER and the environment

ACTIVITY SEQUENCE

1. Introduce the lesson with the activity Rehabilitation of an oil shale mine. Divide students into pairs or threesomes to discuss this activity and write their answers.

2. The correct answer is that photographs 1 and 3 are of the native bushland and photographs 2 and 4 are of the rehabilitated mine site. (The trees planted from seedlings twenty years earlier have since regenerated, with many healthy saplings thriving).

3. Use the Oresome Resources Oil Shale Fact Sheet to introduce oil shale and the mining process (www.oresomeresources.com/resources_view/resource/fact_sheet_oil_shale). The oil shale at the QER New Fuels Development Centre at Yarwun near Gladstone is fairly shallow, hence it is accessed via surface, open pit mining using shovels and trucks.

4. Watch short video: QER web site www.qervisitorcentre.com.au/ –> QER and sustainability –> Environment –> QER and the environment

5. Visit the QER web site www.qervisitorcentre.com.au/ and select "QER and sustainability" and then "Environment." Explore the list of ten bullet points (or follow the ten dots along the bottom) to compile a list of all the methods that are used to reduce greenhouse gas and other emissions at the QER New Fuels Development Centre.

6. Discuss students' findings as a class. They should have found such things as: reduction of greenhouse gas emissions, capturing and recycling rainwater and wastewater, reduction of haulage distances and increases in transport efficiency, increases in energy efficiency in the processing plant, forestry plantations to capture carbon dioxide, land rehabilitation and gas emission treatment processes. Water management is a very important priority at this site. The site at Stuart is vastly different to a coal site because it receives 1.3m of rain every year, compared with just millimetres at many Queensland coal sites.

OPPORTUNITIES FOR CONDUCTING FORMATIVE ASSESSMENT

- Informal observation of student's abilities to compile list of all the methods that are used to reduce greenhouse gas and other emissions

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LINKS TO OTHER LEARNING AREAS

The following suggested activities may be used to provide a link between the content of this unit and that of other learning areas, in particular those related to Mathematics, English and ICT.

- students could investigate maps of environmentally sensitive areas (ESAs, such as the map provided, webmap.pdf), applying mathematical skills in interpreting maps. More maps such as this can be sourced from the Queensland Government.

ADDITIONAL RESOURCES

- www.qervisitorcentre.com.au – Extensive overview of QER New Fuels Development Centre, including video snippets, animations, graphs, maps and explanations relating to:
  - Australia's fuel challenge
  - QER and sustainability
  - benefits for Australians
  - turning oil shale into fuel
- Oil Shale fact sheet www.oresomeresources.com/resources_view/resource/fact_sheet_oil_shale

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