**NZQA**

**Approved**

Achievement standard: 90945 Version 3

Standard title: Investigate implications of the use of carbon compounds as fuels

Level: 1

Credits: 4

Resource title: Fuels: friend or foe?

Resource reference: Science VP-1.6 v2

Vocational pathway: Manufacturing and Technology

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| Quality assurance status | These materials have been quality assured by NZQA. NZQA Approved number A-A-02-2015-90945-02-7290 |
| Authenticity of evidence | Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material.Using this assessment resource without modification may mean that learners’ work is not authentic. Assessors/ educators may need to change figures, measurements or data sources or set a different context or topic to be investigated or a different text to read or perform. |

Vocational Pathway Assessment Resource

Achievement standard: 90945

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Learner instructions

# Introduction

This assessment activity requires you to investigate the implications of the use of carbon compounds as fuels on the environment.

You are going to be assessed on how comprehensively you investigate the implications of the use of carbon compounds as fuels.

The following instructions provide you with a way to structure your work so you can demonstrate what you have learnt and achieve success in this standard.

Assessor/educator note: It is expected that the assessor/educator will read the learner instructions and modify them if necessary to suit their learners.

# Task

Working at an electricity generation plant, you are asked to research and prepare a report on the implications of the use of carbon compounds as fuels on humans and/or the environment.

Around the world coal, a carbon compound, is used in the manufacture of electricity.

Carbon compounds are non-renewable sources of energy. Coal is burnt and the heat created is used to boil water. The steam produced from the boiling water turns turbines that power generators which manufacture electricity. The burning of coal to manufacture electricity creates carbon dioxide gas, a green-house gas that is pumped into the atmosphere.

There is a global initiative to use renewable sources, like hydro, wind and geothermal energy, to manufacture electricity because scientific evidence indicates that green-house gases are the fundamental cause of global warming.

## Conduct research

Research the implications of the use of carbon compounds as fuels on humans and/or the environment.

Process your research information and use it as the basis for your report in which you highlight the implications of using carbon compounds as fuels on humans and/or the environment.

Research can be conducted in groups but you must produce your report individually.

## Create a report or presentation

Your report could include:

* complete and incomplete combustion
* effects of the gases produced on people and/or the environment
* implications of the use of carbon compounds as fuels on global warming and/or pollution or ocean acidification
* comparing and contrasting the efficiency and implications of using renewable and non-renewable sources of energy to generate electricity.

All sources of information, images, diagrams, and data must be acknowledged and referenced in a format that enables them to be easily traced.

In your report, you should aim to elaborate, justify, evaluate, compare and contrast, or analyse the implications of the use of carbon compounds as fuels on humans and/or the environment.

Submit your report in the agreed format.

# Resources

Useful websites include:

<http://www.ucsusa.org/clean_energy/our-energy-choices/coal-and-other-fossil-fuels/the-hidden-cost-of-fossil.html>

<http://www.ems.psu.edu/~radovic/Chapter11.pdf>

<http://www.nrdc.org/globalwarming/>

<http://www.energy4me.org/energy-facts/>

<http://www.mpoweruk.com/energy_efficiency.htm>

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Assessor/Educator guidelines

# Introduction

The following guidelines are supplied to enable assessors/educators to carry out valid and consistent assessment using this internal assessment resource.

As with all assessment resources, education providers will need to follow their own quality control processes. Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material. Using this assessment resource without modification may mean that learners' work is not authentic. The assessor/educator may need to change figures, measurements or data sources or set a different context or topic. Assessors/educators need to consider the local context in which learning is taking place and its relevance for learners.

Assessors/educators need to be very familiar with the outcome being assessed by the achievement standard. The achievement criteria and the explanatory notes contain information, definitions, and requirements that are crucial when interpreting the standard and assessing learners against it.

# Context/setting

This activity is a directed research assignment which requires learners to carry out a comprehensive investigation.

Learners are required to prepare a report on the implications of the use of carbon compounds as fuels on humans and/or the environment. Carbon compounds should not be restricted to carbon chains that contain up to 8 carbon atoms.

# Conditions

Learners’ work will be individually assessed.

Decide on the format of the final report. You may wish to take learner preferences into account in deciding on the format, which could be but is not limited to:

* a written report (including illustrations, diagrams and graphs, if appropriate)
* a poster presentation (including annotations or supporting notes)
* an oral presentation (with written references)
* a project booklet
* multi-media (for example, a recorded video presentation or web page with embedded video, graphics, and text)
* a computer presentation software file.

Provide instructions on referencing, as all sources of information, images, diagrams, and data must be acknowledged and referenced in a format that enables them to be easily traced.

Non-text formats, for example an oral presentation, must be supplemented by a written list of references.

# Resource requirements

Learners will require access to the internet for research.

# Additional information

None.

# Assessment schedule: Science 90945 – Fuels: friend or foe?

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The learner investigates the implications of the use of carbon compounds as fuels on the environment by:* processing and describing implications of the use of carbon compounds as fuels on humans and/or the environment
* using chemistry vocabulary

For example:*Carbon monoxide produced by burning carbon compounds binds with haemoglobin and prevents oxygen from binding with haemoglobin resulting in poisoning.**The above expected learner responses are indicative only and relate to just part of what is required.* | The learner investigates, in depth, the implications of the use of carbon as fuels on the environment by:* making and explaining links between complete and incomplete combustion and the implications of the use of carbon compounds as fuels on humans and/or the environment
* explaining why renewable sources of energy are more efficient
* using chemistry vocabulary

For example:*Incomplete combustion of carbon compounds produces soot. Soot is an aerosol particle and is inhaled. Soot can penetrate deep into the lungs and block the exchange of oxygen and carbon dioxide. This action can cause cancer, heart attacks as well as acute bronchitis and aggravated asthma among children.**The above expected learner responses are indicative only and relate to just part of what is required.* | The learner investigates, comprehensively, the implications of the use of carbon compounds as fuels on the environment by:* comparing and contrasting the implications of the use of carbon compounds and renewable sources
* justifying the use of renewable sources of energy as fuels to generate electricity
* consistently using chemistry vocabulary

For example:*Using carbon compounds as fuels has a serious impact on the environment. It largely accounts for significant growth of carbon dioxide and other green-house gases in the atmosphere. Alternatively using renewable sources of energy like solar radiation and wind are environmentally friendly by providing energy without producing pollution and green-house gases. Since solar radiation and wind are renewable, they will produce energy indefinitely.**The above expected learner responses are indicative only and relate to just part of what is required.* |

Final grades will be decided using professional judgement based on an examination of the evidence provided against the criteria in the Achievement Standard. Judgements should be holistic, rather than based on a checklist approach.