



Carbon Capture & Storage - Resources

Thank you for downloading this Carbon Capture & Storage resource from the *GeoBus* website.

This resource pack was developed in partnership with [The Crown Estate](#), with support from [The Global CCS Institute](#), [Royal Dutch Shell](#) and [SCCS](#). Special thanks are due to Megan O'Donnell and Katy Relf for their involvement. These resources, and further carbon capture and storage education materials can be found on the [CO₂ degrees challenge](#) website.

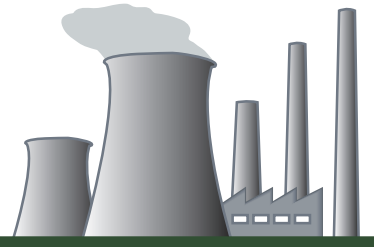
The development of this resource would not have been possible without the generous support of the *GeoBus* sponsors, which we gratefully acknowledge.



Earth & Environmental Sciences



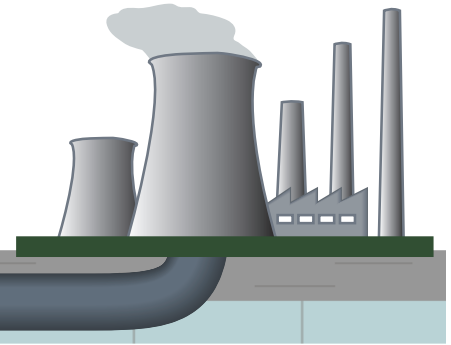
Chapter 2



1. Saying YES to CCS?

Saying YES to CCS?

Teacher Notes



Activity Description

Students consider the advantages and disadvantages of carbon capture and storage. They have to discuss and agree as a group how to divide the factors into advantages and disadvantages.

Time

1 hour

Learning Outcomes

- To consider the advantages and disadvantages of carbon capture and storage
- To evaluate the risk/reward ratio of carbon capture and storage
- To create a mind map

Student Organisation

Pairs / Groups

Materials Needed

List of CCS Factors, Saying Yes to CCS Student Worksheet

Saying Yes to CCS?

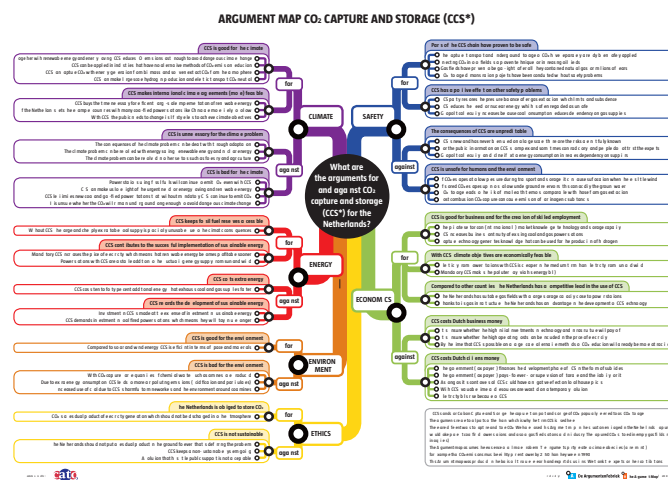
You will need:

- 4x A4 sheets of paper
- 1x sheet of A3 paper
- 1x scissors
- pencils and pens
- 2x baskets/buckets/bins/boxes

Task

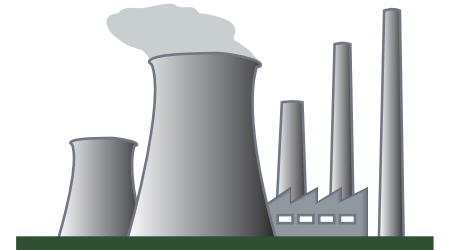
The students make cards representing each factor of CCS from the list provided. They are also given the chance to make up their own factors as they think of them in groups. They have to discuss and agree whether each factor is an advantage or a disadvantage before summarising their results in a table or on a mind map

See attached PDF of the 'argument map' for CCS in the Netherlands for use as an example.



Saying YES to CCS?

Student Worksheet



Saying Yes to CCS?

In this activity we consider the advantages and disadvantages of CCS.

Work in groups of 2 – 4.

You will need:

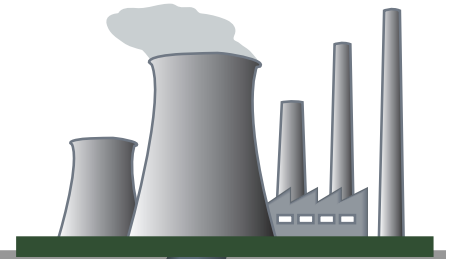
- 4x A4 sheets of paper
- 1x sheet of A3 paper
- 1x scissors
- pencils and pens
- 2x baskets/buckets/bins/boxes

Instructions

1. Cut each A4 sheets into four equal pieces, so you end up with 16 x A6 sheets.
2. Write the name of each CCS factor on the front of each sheet, draw a picture if you like, and copy the definition onto the back.
3. Use the two baskets for advantages and disadvantages.
4. Discuss in your groups and decide where the factor belongs.
5. Some factors may not fit in either basket (as they can be both) and they can be placed in the centre.
6. Once you have all agreed draw a mind map or table of the advantages on one side of the paper and a mind map or table of the disadvantages on the other.

Saying YES to CCS?

List of CCS Factors



The following list describes some factors to be considered in the Saying Yes to CCS task. Feel free to make some extra blank cards and add your own as you come up with them.

RETROFIT

CCS can be added to existing CO₂ sources, reducing the cost of implementation and the need for materials.

EOR (ENHANCED OIL RECOVERY)

CO₂ injection can increase the lifetime of fossil fuel reservoirs that are running low by increasing the pressure enough to drive out extra reserves.

LESS FREE CO₂

CO₂ in the atmosphere will be reduced.

KEEPS FOSSIL FUELS IN THE PICTURE

CCS allows fossil fuel reserves to continue to be exploited.

SPACE and MATERIALS

In comparison to solar or wind energy technologies, the space and materials required to implement CCS are minimal.

ASSOCIATED EMISSIONS

The CO₂ emissions associated with separation of CO₂ from combustion waste, transportation and compression at the site, should be considered.

PROVEN CASE STUDIES

There are numerous long-term case studies proving the success and safety of CCS on a variety of scales and in a variety of locations. As each site is unique proven case studies do not guarantee safety for every project. However it is an indication that if best practice is used CCS can be successful and safe.

STABILISING RESEVOIRS

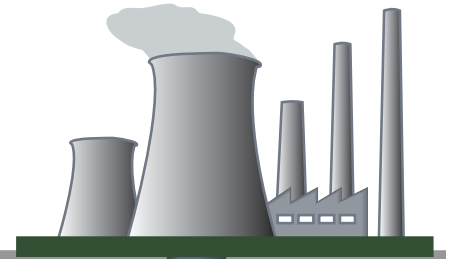
When oil or gas is removed from a formation it creates a pressure imbalance due to removal of supporting material. CO₂ injection can help to stabilise this imbalance.

JOBS

CCS implementation creates jobs requiring many different levels and types of skills.

Saying YES to CCS?

List of CCS Factors



COST

CCS is currently an expensive practice. Improvements in efficiency of capture and transport technology could reduce this cost.

RESEARCH

A drive to implement CCS will fund academic research in this field. This will aid the progression of science in this field.

PUBLIC VIEWS

The public have a poor veiws of CCS, which is likely to hinder planning applications and funding. This is because of the likely social impact of transportation by tankers and uncertainty surrounding changing underground pressure.

WASTE

CCS creates chemical waste that must be dealt with responsibly and economically.

SCALE

CCS is always going to be a risk if implemented on an untested scale or formation.

ENVIRONMENTAL CONCERNS

There are many concerns with how CCS will impact on the environment. Most are based on leakage scenarios that are unlikely if CCS is implemented using best practices.