

# Miss MOLECULE & friends (episode 2) / METHANE



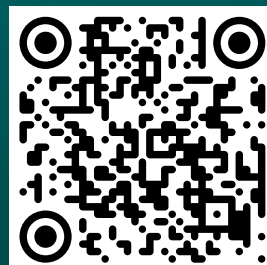
## Key Stage 2 & 3 lesson plan

Methane is a potent greenhouse gas that traps heat in our atmosphere. Due to human activities like farming and industry, its levels are currently at a record high. Fortunately, solutions are emerging, such as converting cow manure into clean energy and using satellites to detect methane leaks worldwide.

Episode 2 link: [www.missmolecule.co.uk/episode2](http://www.missmolecule.co.uk/episode2)



Scan or click the QR code to watch the episode:



Miss  
**MOLECULE**  
& friends

A Studio Wallop production

**STUDIOVALLOP**

Miss Molecule & Friends © Studio Wallop

Created  
together  
with:



International Fugitive  
Emissions Abatement  
Association  
[www.ifeaa.com](http://www.ifeaa.com)

Funded by:



Funded by  
UK Government



**CORNWALL  
COUNCIL**  
one and all • onen hag all



Council of the  
**ISLES OF SCILLY**



**GOOD  
GROWTH**  
CORNWALL & ISLES OF SCILLY  
SHARED PROSPERITY FUND

# Miss Molecule & Friends

## Lesson Plan for Episode 2 'Methane'



### Overview

Methane is a natural gas that has been in our atmosphere since the beginning of Earth. It is released from sources such as bogs, forest fires, ocean floors and wild ruminant animals, and levels of naturally produced methane in the atmosphere have remained stable for millions of years.

Human activities such as fossil fuel production, agriculture, and waste management are increasingly emitting more and more methane into our atmosphere. Methane is a powerful greenhouse gas that is many times more harmful than carbon dioxide in terms of warming the Earth.

It is becoming increasingly important for scientists to monitor and control the amount of methane emissions from human activity and find solutions to reduce emissions worldwide, reducing the effect of climate change.

This lesson encourages students to learn about methane, what it is, where it comes from, why having too much in the atmosphere is helping to warm the planet, and what solutions are being found to reduce emissions.

Many companies and organisations worldwide are finding smart ways to reduce or reuse excess methane, such as making biomethane fuel for transport, creating electricity, and even sending rockets into space! Here in Cornwall, Bennamann is turning excess methane from their cow waste into fuel for tractors and helping farms become more sustainable. We also hear about how satellites identify and monitor methane emissions to help find leaks and reduce emissions.

This lesson will be a resource for teachers to deliver themselves when best suited. It has curriculum links to science, engineering, history, maths, and climate change.



### IFEAA & The Net Zero Methane Hub

These resources have been delivered in conjunction with the International Fugitive Emissions Abatement Association (IFEAA) and the Net Zero Methane Hub and funded by the UK Shared Prosperity Fund.

The UK Shared Prosperity Fund aims to improve pride in place and increase life chances across the UK by investing in communities and places and supporting local businesses, people, and skills. IFEAA is a not-for-profit organisation that works to accelerate action to reduce fugitive greenhouse gas emissions.



### Lesson Objectives

The lesson will enable students to:

- Gain knowledge of the characteristics of methane.
- Identify the two sources of methane and how human activity affects methane concentrations in the atmosphere.
- Understand the scientific and technological solutions being developed to reduce or reuse methane emissions.

### Age

This lesson is aimed at students in upper Key Stage 2 and early Key Stage 3 and those in years 6 and 7, aged between 9 and 12. It is designed to be inclusive of all learners, with visual, audio, and physical activities included and additional learning suggestions for further understanding.

### Resources (provided)

Animation (27 mins), Workbook, Graphics pack.

### Resources (needed and not supplied)

Whiteboard, Paper/pens.

### Timings

50 minutes. Additional time can be spent on the activity, or it can be set as homework.

### Curriculum links (Upper Key Stage 2)

#### Science

- Animals including humans.
- Living things and their habitats.
- Properties and changes of materials.
- Evolution and inheritance.

#### Geography

- Human and Physical Geography.

#### History

- A local history study.

### Curriculum links (Lower Key Stage 3)

#### Science

- Relationships in an ecosystem.
- Cellular respiration.
- Earth and Atmosphere.
- Energy.
- Particle model.

#### Geography

- Human and Physical Geography.

#### History

- A local history study.

### Some useful links for more information:

IFEAA: <https://www.ifeaa.com/>  
 Global Methane Pledge: <https://www.globalmethanepledge.org/>  
 Global Methane Hub: <https://www.globalmethanehub.org/>  
 Net Zero Methane Hub: <https://www.methanehub.co.uk/>  
 BBC Bitesize (What is Methane): <https://www.bbc.co.uk/bitesize/articles/zfmm6yc>  
 Bennamann: <https://bennamann.com/>  
 GHGSat: <https://www.ghgsat.com/en/>



# Lesson Plan (50 minutes)



## Starter / Introduction (Resources: Pen/paper, Whiteboard. Time: 5 mins.)

Who's heard of methane?

The teacher asks the class to give short answers – write on the board or a piece of paper.

The teacher can give small clues such as 'it's a gas' or 'we use it for cooking'.

## Animation & Worksheet (Resources: Animation, Worksheet. Time: 40 mins.)

The animation is 27 minutes long and can either be played in full or broken into 10-minute sections as outlined below:

### 00.00-10.10 minutes

The latest episode of Miss Molecule & Friends features 'Synth' and 'Bog', representing the two different sources of methane released into our atmosphere.



'Bog' – represents naturally released methane from swamps, bogs, the ocean floor, and animals with ruminant digestive systems, such as antelopes, deer, goats, giraffes and termites.



'Synth' – represents the synthetic or human caused methane-released from activities such as fossil fuel production and transport, agriculture (specifically dairy/meat production), sewage treatment and landfills.

The first 10 minutes of the film provide some general knowledge about methane. Each character explains where they come from so that learners understand the two sources of methane and why too many human-caused methane emissions in the atmosphere contribute to climate change. We also look at where it was discovered and two Cornish inventors who found uses for methane in the 18th century.

### 10.10- 21.50 minutes

We then delve into some of the solutions being developed to stop excess methane emissions from being released. Miss Molecule talks to two different companies providing different solutions:

## GHGSat - Daniel Wicks

- Use 12 satellites to monitor and identify methane being released into the atmosphere from sources such as fossil fuel production and transport, coal mining, waste facilities and landfill sites worldwide.
- The satellites pick up a specific frequency of light to detect methane in the atmosphere and can 'see' where the leaks are coming from.
- Once the emissions are identified, solutions can be found to fix the leak or reduce the emissions released.
- GHGSat measured 378 million tonnes of CO<sub>2</sub> equivalent of methane emissions in 2023, twice as many as in 2022. Of those emissions, 6 million tonnes were mitigated, equivalent to 1.5 million cars off the road for a year! They are hoping to increase the amount mitigated to 50 million tonnes.
- They are constantly evolving the sensors on their satellites to detect even the smallest amount of methane released and hope to one day be able to monitor every single industrial facility in the world.

Find out more on their website: <https://www.ghgsat.com>

## Bennamann - Dr Chris Mann

- Turning cow waste into biomethane – creating vehicle fuel for tractors.
- Smart covers capture the methane produced from the waste of the animals.
- The nutrients in the slurry are used to grow food without artificial fertiliser.
- Farms are now becoming self-sustainable. They use all their waste for vehicle fuel and create electricity via generators; the only thing that leaves the farm is food.
- Farms can have a negative carbon footprint using this system.
- Slurry doesn't end up in streams or the sea, meaning a cleaner surfing experience!

Find out more on their website: <https://bennamann.com/>

### 21.50 - 27.21 minutes

The final part of the film looks at the exciting ways methane can be used in the future, including space travel! We also find out how global initiatives are helping to reduce emissions through the Global Methane Pledge.

## Worksheet – 10 minutes (Resources: Pen/paper, Whiteboard. Time: 5 mins.)

Complete the worksheet using the animation, keywords, and teacher notes. It could be completed in one go or broken down into sections to align with the animation.

There is a wordsearch at the end of the workbook, you can also complete this online here: <https://thewordsearch.com/puzzle/7986992/methane-keywords/>

## Plenary

Review your original brainstorm about methane – what can you add to it? Build a picture of the methane story and see what you have learnt!

## Activity

(Resources: Animation, Worksheet, Sticker Sheet.

Time: Up to you.)



Become a Methane Detective!

Methane emissions and their effect on the planet are a hidden threat that few people know about. Now that you have some knowledge from the animation, your task is to research and communicate to as many people as possible what methane is, why it is important to reduce the amount released into our atmosphere and what is being done to tackle the problem. Below are some examples of projects and topics for you to use.

You can be as creative as you like (we have provided some graphic elements you may want to use), but here are some ideas:

Some examples of what you could produce:

- A poster.
- Information leaflet.
- News report (either written or spoken).
- Create a game to show which emissions come from each source (Bog & Synth).
- Create a display for your school.
- Take an assembly – dress up as Bog & Synth!
- Model the tractor and satellite to show how these are helping to reduce emissions.

You could base your project on the following topics:

- What is methane, and why does too much in the atmosphere contribute to climate change?
- The differences between naturally made and human-caused methane.
- Mining – why was it essential to find the methane in the mines, and who found the solution (Humphry Davy & William Murdock)?
- Methane-fuelled rockets.
- Agriculture and methane emissions – why do cows make methane when chewing their food, and how can it be turned into fuel for tractors?
- Satellites and how they can monitor methane emissions.
- The methane cycle.



**We would love to showcase your work on our website and social media feeds. If this is something you'd like to do, please send images of your student's work and a caption to [hello@missmolecule.co.uk](mailto:hello@missmolecule.co.uk)**

**Watch and learn more from Miss Molecule's episodes online! [www.missmolecule.co.uk](http://www.missmolecule.co.uk)**